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EXPLORING THE USEFULNESS OF A DIGITAL MARKETING DASHBOARD AND  
ITS FUTURE DEVELOPMENT: A CASE OF GROUPM

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Abstract (100 words maximum)

Digital media's growth in the media investment industry is generating large amounts of valuable data that companies struggle to leverage. GroupM built a dashboard to support SEO consultants' decision-making. Although most challenges come from users, they are often forgotten when evaluating the success of dashboards. After being used for six months, this dashboard's usefulness and future development must be assessed. Two qualitative research methods were used: unstructured observation and semi-structured interviews. Six major benefits and a new direction for the dashboard were established. This study found the author and users' data literacy is the main influencer of the dashboard's success.

Keywords: dashboard, decision support, case study, business intelligence, visualization

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## 1. Introduction

The media investment industry is big and keeps growing, presenting companies with increasing opportunities worldwide. In 2021, it generated 763204.4 million US dollars<sup>1</sup> in revenue at a global scale and grew 22.5%, after a decrease of 3.1% in 2020 due to the Covid19 Pandemic. Until 2019 the tendency had been for this industry to grow and it is now expected to maintain that growth in the coming years. During the past decade, the industry has shifted most of its revenue from traditional to digital media and the Covid19 Pandemic increased this tendency. In 2021, digital advertising accounted for 64.4% of all advertising, presented a growth of 30.5% and had generated 491445.6 million US dollars in revenue at the end of the year. In 2020, it was the only medium with positive growth, at 12.5%, with Cinema suffering the biggest decrease at 79% (GroupM, 2021). Globally, the biggest players are WPP, Omnicom Group and Publicis Groupe (Top 10 Ad Agencies Leading the Advertising Industry in 2022, 2022).

In Portugal, where this case study was conducted, the same industry growth tendencies are verified. The Portuguese media investment industry was worth 829.9 million US dollars and grew 9.9% in 2021. Digital advertising does not have the same weight in the Portuguese market as it does globally, presenting a share of 24.2%, however it has the second biggest share after TV, at 44.4%, and the biggest growth at 19.1%. Even though all advertising mediums failed to achieve positive growth in 2020, the least affected was digital advertising, which presented a decrease of 7.4%, with Magazines suffering the severest decrease, at 43.2%. (GroupM, 2021). The biggest player is GroupM, part of WPP, with a market share of 20%, followed by Havas Media Group at 16% and Omnicom Group at 12%. (GroupM, 2022)

As Digital Marketing grows, the amount of data media companies have access to grows as

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<sup>1</sup> Global numbers are excluding U.S. Political Marketing

well. This data is also more accurate than data generated through traditional media and it is generated automatically. Due to this, companies are looking to leverage this data to achieve valuable insights and are aiming more and more for data-driven decisions. However, having access to data is not enough, companies need to know how to store it and use it in an efficient, scalable, and accessible way so they can take full advantage of it.

GroupM Portugal, one of the WPP companies and the leader in the Portuguese market, is exploring the opportunities in Digital Marketing and hiring different profiles to tackle these challenges. I was hired for an Internship in the Summer of 2021, during my Masters in Management, due to my background in Data Science and my current studies in Management and Marketing. I was placed in the Organic Performance team, which mainly does Search Engine Optimization (SEO) consultancy for GroupM's clients, due to the nature of this field as it generates substantial amounts of data that need to be analyzed. During this internship, I identified a need to simplify and automate some repetitive tasks and unlock new insights through processing technical SEO data, so I developed a dashboard with this objective in mind. This dashboard analyses most of the technical SEO data of a website obtained through a crawl and attributes scores to each page and section, calculating a final SEO Score, to prioritize and guide an SEO consultant through the bigger problems on a website; while also giving more priority to pages with more visitors by getting data from Google Search Console and calculating a metric with the name Page Importance. It has now been in use for 6 months at GroupM Portugal and was applied to several clients in different industries. Screenshots of this dashboard are available in Appendix 4.

My study aim is to understand how this dashboard impacts the work of the SEO team and in which direction it should be developed further. Therefore, this thesis is structured as follows: in section 2, I will revise existing literature on the role of business intelligence in companies, particularly on the use and development of dashboards; in section 3, I will present the

proposed methodology, followed by the results achieved in section 4; and finally, in section 5, I will make my recommendations regarding possibilities for further developments.

## **2. Literature Review**

My aim in this project is to describe how the use of this dashboard was transformational for the SEO team and see what lies ahead. For that purpose, I will start by revising the existing body of knowledge on Business Intelligence and Dashboards, particularly in companies.

In the last decades, the BI field has gone through big changes and has grown considerably, both inside and outside of academia, due to the advancements in technology, particularly when it comes to big data and machine learning (Ain et al., 2019; Trieu, 2017). Companies have been investing in this area and developing their capabilities, however they seem to struggle to realize value from their BI systems (Audzeyeva & Hudson, 2016; Visinescu et al., 2017). In academia, the amount of research conducted and published has also increased noticeably, going from 22 BI related publications between 1988 and 1997 to 1622 publications from 2013 to 2017 (López-Robles et al., 2019). As the field evolved, the definition of BI has evolved as well and is now used as a broader term that encompasses processes, concepts or methods that contribute to an enhanced and more informed decision making through the use of fact-based support systems (Trieu, 2017). Therefore, dashboards are included in this field and have seen a similar evolution to BI over the years (Ain et al., 2019). Dashboards started as single-view reporting displays but can now include “interactive interfaces with multiple views and purposes, including communication, learning, and motivation, in addition to the classic notions of monitoring and decision support”. Their use expanded not just in complexity, but also in industries and type of users (Sarikaya et al., 2019).

Within business organizations, dashboards are mostly used to assist with decision-making

(Ain et al., 2019; Sarikaya et al., 2019), driving performance and business value. This happens through the support they provide in identifying patterns and correlations among large amounts of data (Paradza & Daramola, 2021). There are three common categories in which most dashboards fit, according to their purpose: operational, tactical, and strategic. The first ones present current metrics that can lead to quick actions and solutions; the second type can help an organization evaluate and improve their tactics; finally, a strategic dashboard provides a long-term view and assists in long-term strategic decisions through visualization of high-level metrics (Sarikaya et al., 2019). However, a dashboard may not fit only one of these categories and Sarikaya et al found these to have a typical structure that started with an overview and proceeded to show information in more detail. Besides this primary use, dashboards in a business context are also often used as a means to communicate across contexts, as they provide a common frame of reference. They can be consulted by different departments, management, or even other organizations, and are frequently a very convenient tool used in presentations.

Ain et al found, in their systematic literature review, three key categories for adoption, utilization and success (AUS) in BI: organizational perspective, information system (IS) perspective, and users' perspective. The first category comprises factors related to the organization's goals and strategies, for instance management support, BI management, and a technology driven-strategy. In their review paper, Paradza and Daramola support Ain et al's discovery by stating BI applications and usage/data culture, BI alignment with organizational goals, and top management support fall within the main critical factors to derive Business Value from BI. Particularly in dashboard development (Vazquez-Ingelmo et al., 2019) support this. The second category of Ain et al includes IS-related factors, such as technological BI capabilities, information and system quality, and IT infrastructure. Paradza and Daramola reinforce this by identifying BI Infrastructure and data quality as two of the three main drivers

of BV in BI, which is further supported by Vazquez-Ingelmo, Garcia-Penalvo, and Theron through the claim that the available data and resources will influence the development of a tailored dashboard. The third and final category represents the importance of human-related factors. Once more, both Paradza and Daramola, and Vazquez-Ingelmo, Garcia-Penalvo and Theron's findings agree with this conclusion. Moreover, Paradza and Daramola identify skilled human capital as the prevailing factor mentioned in literature when it comes to extracting BV from BI, concluding this "emphasizes the importance of having skilled personnel within an organization". However, Ain et al found that "human factors have been largely ignored in the study of BI system adoption, utilization and success", explaining that most studies have focused on the first two categories and few have "taken users' perspective into account". Vazquez-Ingelmo, Garcia-Penalvo, and Theron confirm this finding related to tailored dashboard development, stating that in most studies proposed solutions were tested concerning their functionality, yet "few works also included testing regarding user experience and insight delivery".

According to Sarikaya et al, the major challenges to dashboard design are divided into four categories, two of which are shared with other visualization tools. These are: end-user flexibility; visual, analytic and data literacy; data design; and social impact. The first refers to the need for analytical support and flexibility for different users, who might require different functionalities depending on their role or experience, however automatic adaptation to each user is still a challenge. The second refers to the barriers caused by weak data literacy on the part of users, which puts a burden on authors to train non-expert users and still sacrifice interactivity or customizability to reduce complexity. Moreover, due to the rising accessibility of tools to build dashboards, these are increasingly being built by non-experts with low data literacy levels themselves. While the first and second categories are also challenges for other visualization tools, the third and fourth categories are specific to dashboards. The third one

refers to choices of data and its representation in the context of dashboards. It is important to have the right data available to support a decision, however choosing which data is appropriate is often a challenge. Contributing to this is the fact that having too little data represented in a simplistic way may oversimplify a problem and restrict decision making, however presenting more detail than needed can lead to information overload and inaccurate decisions. Nevertheless, it is still important to provide information on the underlying data and how it is processed in order to create trust. The fourth and final category refers to concerns related to data-limited thinking due to the impression that data is always objective and issues of privacy and control over data.

The existing body of knowledge reveals business intelligence has a growing impact on companies' performance, however there are usually barriers to its adoption, use and success (Ain et al., 2019). Furthermore, there is a clear lack of focus on the users of these tools when it comes to measuring their effectiveness, even though the biggest challenges appear to come from the users themselves (Ain et al., 2019; Sarikaya et al., 2019). In the specific case of GroupM, the dashboard in this study has now been in use for several months. It is therefore important to understand if and how this dashboard suffers from the issues described in literature, particularly where it pertains to its users. Therefore, my research questions are:

RQ1. How does the SEO team at GroupM use this dashboard?

RQ2. What developments should the dashboard go through in the future?

### **3. Methodology**

This case study followed an interpretivist philosophy and an exploratory approach due to the goal of discovering attitudes and beliefs of the users towards the dashboard and of possibly identifying themes I had not previously considered. Interpretivism considers “human beings and their social worlds cannot be studied in the same way as physical phenomena” (Saunders et al., 2019) and, in a business context, intends to interpret situations by understanding the point-of-view of a specific group inside an organization, in this case the SEO team at GroupM as users of the dashboard in study. This resulted in a mixed-method qualitative research that consisted of two different research tools for gathering primary data: unstructured observation and semi-structured interviews, with the first method informing the creation of the second. The first batch of data was collected through the unstructured observation of reactions, comments, and conversations on the use of the dashboard and other work-related topics with the different SEO team members. This happened naturally and in an informal environment as I created the dashboard and later proceeded to do this study while working as part of this team.

With those observations in mind, I then built an interview guide, allowing the collection of semi-structured face-to-face qualitative interviews with all stakeholders of the dashboard: three SEO consultants and their team leader. The goal was to understand the dashboard’s usefulness and impact in their work and how it could be improved and expanded. To that end, the interviewees were asked about these topics, as well as about any barriers they felt in the use of the tool, specifically when it came to the four areas described in literature: end-user flexibility; visual, analytic and data literacy; data design; and social impact.

The four people that compose the SEO team have degrees in the fields of communications and/or marketing, 2 of them are female and 2 are male. Two members, including the team leader, are in their thirties and have at least five years of SEO experience, they both also did

a post-graduation in data science. The two younger members are in their twenties and this is their first job; one of them has been in the company for close to two years, while the other is a trainee, having started earlier this year. The interviews were conducted in Portuguese, my (the interviewer) mother tongue as well as the interviewees', and lasted from 30 minutes to 1 hour. They were audio-recorded and then partially transcribed and translated. Afterwards, the responses were analyzed through a content analysis grid and links were drawn to the informal observations made previously and to the existing literature, with the final goal of forming conclusions for each research question. The full interview guide, interviewee's profiles and content analysis grid can be found in Appendices 5, 6 and 7.

## **4. Analysis and Discussion**

### **4.1. Unstructured Observation**

During the creation of the dashboard and involved processes, I was able to get acquainted with the members of the SEO team and to observe their work and interactions with data and visualizations both in this dashboard and other tools. Due to my background in computer science and my high level of data literacy, I was able to assess their visual, analytical and data literacy levels compared to each other. Based on my observations, the team leader (I1) has the higher level among the team. During the development of the dashboard and the system behind it, he was able to understand the problems I encountered on a technical level, even if he might not have been able to solve them. He has also helped the team explore opportunities related to the data they work with and even developed some automated reports and dashboards with no-code and low-code tools. He can also understand the level of complexity of different tasks without much explanation and has been, therefore, able to help prioritize new developments in a way less data literate members cannot. I2 has the second highest visual, analytic and data

literacy level and is constantly eager to learn more and put in practice what she learns. Although she is aware of the possibilities data science offers, she is not able to distinguish their level of complexity. Throughout this project her skills have evolved due to her interest in this and other projects being developed in the team, and she is now able to use the tool in which the visual part of the dashboard was developed, to edit it and create other visualizations. Then comes I3, he can interpret and work with data with the tools he is given and is interested in learning and using new ones. He is not as familiar with data science concepts and therefore has a limited understanding of what happens “behind the scenes” and cannot see all the possibilities other people could. However, he is comfortable enough with data and its visualizations to understand where small adjustments in the tool are necessary and helpful. I4 is the newest member and having started in the job market only 4 months ago, at the time of writing, is a beginner when it comes to SEO and working with data, coming from social sciences degrees where these themes were less explored. Thus, she has just started her journey in visual, analytic and data literacy while already using this dashboard and is aware of her lack of experience in this context. Overall, this team has members on very different levels of comfort when it comes to working with data, all of them able to contribute on different levels to the team and with different expectations and needs to be able to make the most out of the tools they work with.

## **4.2. Semi-Structured Interviews**

This dashboard was created to be used in the monthly recommendations the team sends to their clients, with the goals of: 1) replacing their use of Excel for this task; 2) making it easier; 3) quicker; and 4) more effective. Through the interviews, the team members said they used it for this purpose, quoting I3: *“I use it to detect problems on clients' websites and create recommendations. I look at the pages that are worse technically or I look at the most important*

*pages to see what problems they have.”*. Moreover, the team leader stated he also used the tool when creating proposals for prospective new clients or even while on calls with them, as it *“provides information quickly without incurring extra costs or spending too much time on a task that is not billable”*, while still allowing him to *“show [the website’s] problems to the client so they can see if they really need the SEO team to fix those problems”*.

#### **4.2.1. Benefits**

All team members agreed the dashboard had a positive impact in their work and expressed the multiple advantages it brought. They can be captured in six different, albeit related benefits:

1. **Easier and quicker analysis due to visualization and data processing:** this was unanimously considered the most important benefit. Visualization helps the team in their analyses, as they can now *“break down the website by areas in the overview and see, through the different scores, what are the biggest problems affecting each of the areas”* (I2). I3 adds that he *“can visualize the data through pre-built graphs and tables, which in turn also allows [him] to look at the data in a different way and get better insights than by just looking at numbers.”* It is also extremely helpful for beginners, as I4 says: *“I am not an expert... being able to put a filter and quickly realize that I only have to export this information in an isolated way helps me a lot to optimize the work I have done so far.”* All of this is also possible due to the data processing that happens before all this is displayed visually in the dashboard, which allows them to *“draw insights faster”* (I1), as they can now *“group, filter, and analyze data that used to take longer to organize”* (I3).
2. **Bigger profit and value creation due to the time saved:** this is a direct consequence from the first benefit, as the team leader puts it *“one of the added values of this*

*dashboard is the possibility to automate some processes in the team that "free" time for more value-added work. We can be more efficient and effective, which at the end of the day means profit.*" This gave the team more time to spend on tasks that are not as easily automated, such as *"researching and recommending content creation for the clients' websites"*, according to I2.

3. **More detailed analysis due to bigger granularity of data.** The dashboard *"allowed more granularity in data analysis, URL by URL, whereas before the calculations were always aggregated"* (I2). Now, the team can get *"insights faster, in much more detail and for a larger number of pages/errors, allowing [them] to look at other aspects of SEO that can be optimized"* (I1).
4. **Better and more relevant insights due to the combined use of different data sources.** I2 shares that *"seeing metrics from different sources for the same page is something [they] were not able to do before"* and I3 adds that with this tool he can *"look at the most important pages or sections to see what problems they have"*. I1 believes this is the *"element that sets the tool apart, it allows [them] to prioritize [their] work with [their] clients in a way [they] were not able to before"*, which happens *"by giving [them] a clearer picture of the balance between the most important pages and the ones that are worse in terms of technical SEO"*.
5. **Standardization of work processes and scalability.** I2 says the automation behind the dashboard *"has allowed a reduction in the number of errors due to counting and filtering in Excel"*. I3 argued that *"when data transformation and processing is automated, we reduce the likelihood of errors that can lead to faulty analysis"*. And as I1 puts it: *"although human sensitivity is highly relevant and different from person to person, the fact that we can do analysis consistently and always in the same way or*

*based on the same assumptions, gives us greater confidence in the output”.*

Furthermore, it adds to the time saving benefit by allowing the team to easily *“scale the process to different customers”.*

6. **Cooperation between team members of different backgrounds, contributing to improved data literacy:** this benefit was observed by me throughout the development and adoption processes and it was confirmed in the interviews. *“It brought people from different areas together to work on a multi-disciplinary project”* (I2) and showed *“the team different ways of working and thereby “open” their minds to other possibilities”* (I1).

#### **4.2.2. Key Factors and Barriers for Success**

Although the dashboard was well received there are complications to its use. One of them is the tool used to design the dashboard, Data Studio: a free visualization tool by Google, which although easy to use and without cost, does not possess the same capabilities as more advanced platforms. During the development this tool caused several problems and I1 mentions Data Studio’s limitations as the biggest obstacle to the further development of the dashboard. This confirms what the literature says about Information System capabilities and resources being one of the key factors to BI success (Ain et al., 2019; Paradza & Daramola, 2021; Vazquez-Ingelmo et al., 2019). These authors agree that another of the key categories for the adoption, use and success of BI systems is the users’ perspective, which this study confirms. It was possible to see, both through informal observation and semi-structured interviews, that the team members with higher data literacy can get more out of and contribute more to the development of the dashboard. They are all somewhat aware of their visual, analytic and data literacy level, for example I1 says *“I consider my data literacy to be above the average*

*person's who doesn't have much knowledge in this area, but far from a professional who works with these topics on a daily basis (...) I am able to understand and talk to people that work in the data field*", while I4 says *"I am not an expert in data analysis"*. They also know this can limit them, however most of them might not be able to see how exactly: I2 says *"there is a big impact on the knowledge we have of the data and the good use or not of the tool"* showing she can understand how not having the knowledge she does could impact her use of this tool, but it is harder for her to understand the knowledge she does not possess. I4 is extremely aware of her beginner level, but her answers reveal her difficulty in talking about possibilities she is not familiar with. When speaking about possible further developments for the dashboard, which I will explore later in this section, it was clear by the length and ease of their speech those with higher data literacy had more thoughts on this topic and could formulate them better than the others.

Throughout the months of use of the dashboard, slight adjustments were quickly made per request of the team. As an example, a column with the number of pages per section of the website was added to the overview tables. Members of the team with higher data literacy can do it themselves due to the flexibility of the platform and the structure behind the dashboard. All team members stated they were comfortable using the tool and retrieving the information they needed for it, despite having different levels of experience working with SEO and data. I3 said he can *"can access all the data that [he] already had access to before but in a faster and more accessible way, more appealing and intuitive. It is easier to detect problems."* The newest and least experienced member supports this as she says that *"it has an amount of filters and tabs that [she] can work with and where [she] can get all the information [she] need[s]"*. The team leader, who uses the dashboard for a different purpose, as stated before, also emphasizes *"the flexibility and speed with which [he] can see and extract the data"*. Even though adaptation to each user or case is not automatic, it is still possible, quick, and accessible

and in most cases not necessary, as people with different roles and experience can use the dashboard to perform their jobs. Therefore, the first challenge for dashboards identified by Sarikaya et al, end-user flexibility, is not verified in this case.

This dashboard was built by someone with a degree in Computer Science and who specialized in data, therefore having a high data literacy level. The adoption of the dashboard by the team did require some high-level training to ensure they got the most out of it and that the dashboard was equipped for their needs, but upon her arrival I4 was already trained on its use by I2, not me (the author of the dashboard). Furthermore, the dashboard seems easy to use for non-experts although still complex enough for more experienced users: I4 believes *“it is very beginner friendly. [She has] never had any experience with data analysis before and [she] think[s she does] just fine.”*; I1 thinks the reason is *“the way the dashboard is made does not require much data literacy, because everything is done behind the scenes where you really need more data knowledge. I think the report just needs more visual and analytical literacy to interpret and explore the data. (...) It is done in a simple way, not simplistic, so it is easy for those with less literacy to use.”* Thus, the second barrier (Sarikaya et al., 2019), weak visual, analytic, and data literacy on the part of users, is generally not verified in this case, as most of the team has a medium to high literacy. In the case of those who don't, the challenge is overcome due to my high literacy as the the author and the support of the rest of the team.

The information available in the dashboard seems to be the data needed to support decision making by the SEO team. According to I3 *“it gives the right amount of information, not too much nor too little. [He] think[s] it gives the same information as [they] would have on excel, but in a more organized way.”* I1 and I2 talk of version 1.0 and possible future developments but believe *“this version corresponds to the initial goal we wanted for this dashboard, [They] think it has the necessary information for the initial idea.”* (I1) and *“for the day to day what [they] can get out of there is good and it is better than what [they] had”* (I2). I4, as she is still

in training, does not use the dashboard to its full extent and says *“it gives more info than what [she] uses, but it does not affect [her] work, because it is well organized. [She] know[s] that if [she] need[s] something extra, [she] will find it there.”* The way the dashboard is organized fits with Sarikaya et al’s description of dashboards that do not fit in only one of the three categories discovered by them. The authors state that *“in these situations, the dashboard tended to mimic an overview + detail design”* which is the way the dashboard in study here is built. This structure seems to help overcome the challenge of having too little or too much data, also mentioned by Sarikaya et al.

This team participated in the process of development of the dashboard as it was made based on their work processes and the success metrics they used. Therefore, they *“know the data on the dashboard comes from the crawl [they] perform on websites”* (I3) and they *“know the architecture behind [the dashboard], so [they] trust it”* (I1). Some members understand the algorithm and process better than others due to higher data literacy and involvement in the development, but since it is a knowledge that is shared between the team and something they have the power to change if needed, there are no issues of trust or lack of control over the data. Additionally, I2 defends that *“it is important to trust that the data is correct, but also to have knowledge of the client and their website”* as it helps interpret the data and *“sometimes there are things that (...) for those who don’t know the website may have a certain reading, but (...) when we have knowledge of the business allied to what the data shows we can make more informed decisions.”* I1 agrees saying *“we cannot trust the data blindly, it is there to support us, not do the job for us, we need to interpret it and understand the situation”*. The higher data literacy of some of the team members thus contributes to overcome the data-limited thinking challenge proposed by Sarikaya et al and to increase trust in the data.

### 4.2.3. RQ1

In sum, to answer the first research question, **How does the SEO team at GroupM use this dashboard?:** the dashboard supports the team in their decisions, contributes to a better performance and helps create business value, which is in line with what the literature reveals about the use of dashboards in business organizations. Additionally, it is helpful for reports, presentations, and proposals for clients, which is also consistent with Sarikaya et al's findings. Two of the three key factors identified in the literature for the success of dashboards were verified to be important in this case, as the platform used to create the dashboard presented both problems and benefits, and the medium to high levels of visual, analytic and data literacy of the users improve their use of the tool and vision of its future possibilities. The possible barriers, also identified in the literature, that could hinder the use of the dashboard were not verified by the users, as they believe the dashboard possesses a good end-user flexibility, does not require a high level of data literacy although users who possess higher level of visual, analytic and data literacy are able to get more out of it, has the necessary amount of data and is organized in a way that helps explore it, and finally they trust the data represented in the dashboard but know it should be interpreted and not taken at face value.

### 4.2.4. Future Developments

As the dashboard was received in such a positive way, the team agrees it can and should be developed further. They shared their ideas and needs for future development which can be summarized in seven different goals:

1. **Record and display history to evaluate clients' evolution and the impact of recommendations:** this feature was requested and classified as one of the most important by most of the team. Currently the data from past months is stored, but it is not accessible through any interface. Therefore, in the present version they can only

see the current data; I2 mentioned it would be very helpful to be able to “*compare the current month’s data with the previous one’s*”. I1 stressed the importance of this goal as “*measuring the impact of [their] recommendations is one of the ways [they] value [their] work with [their] clients*”.

2. **Use data to develop a market benchmark:** another way to use the stored data is develop a market benchmark based on the different clients GroupM works with. With the SEO Score data available for all the clients, the team could “*quickly compare clients or define baselines by vertical.*” I1 argues this would allow them to “*answer one of the questions clients ask [them] the most: "How does this score compare to the rest of the market?"*”.
3. **Further develop Page Importance:** this metric is still at an early stage of development, unlike the SEO Score, and helps the team prioritize their work based on the number of clicks a page has. They would like to see it “*developed with the current and more data sources*” (I2) to better reflect the nuances of the importance of a page and would like to have the same type of visibility over it as they do for the SEO Score, with a “*breakdown of metrics to better understand where the problem lies*” (I3). The team leader believes that the dashboard being implemented in the cloud “*opens a pandora's box for [them] to add new data sources and further enrich [their] analysis and recommendations. Sometimes it is in the crossing of several sources that we discover the best insights*”.
4. **Monetize and expand to other markets.** I1 says “*this dashboard allows [them] to think about monetization by subscribing its use for other teams/countries in the future*” which would benefit and value the team’s work and the company’s branch in Portugal. Furthermore, it would support the dashboard’s development, as I2 puts it “*the more*

*data we get and the more teams are using this dashboard, more improvements can be made.”*

5. **Expand dashboard to incorporate other business areas:** this dashboard’s achievements shed light on the possibilities that exist for other business areas, such as Search Engine Advertising (SEA), Display, Analytics, etc., and especially the potential of connecting them. I1 highlights not only *“the internal advantages for a more efficient SEO project management”* but also the advantages for other business areas and the company as a whole. I3 supports this saying that *“by expanding into other areas, it is possible to have a holistic view of the entire digital ecosystem”*, which helps the company better serve its clients.
6. **Improve the interface to help new users.** I3 shares that it could be helpful for new users to have more *“written explanations and captions for some metrics”*, especially as doing this would help the expansion to other areas, teams and markets since it supports *“the use [of the dashboard] for a larger number of people”*.
7. **Improve the interface design to make it more appealing.** I3 believes *“it would be important to improve the layout and design to make the dashboard more appealing”* as it would help expand the dashboard to more people. I2 supports this as it might help *“to showcase it to clients and sell this GroupM proprietary solution”*. However, I1 argues that while important, this should not be a priority: *“although the user interface is very relevant for a project like this, the fact that it can be monetized is even more important in a production logic. In the long term, the possibility of integrating with other areas and creating a history are highly important for the evolution of this dashboard and its continuity.”*

The first three goals support the conclusion that visual, analytic, and data literacy is not a

significant struggle for this team and therefore there is no need to reduce the complexity of the dashboard or of future features, as they are requesting new developments similar in complexity to the current capabilities of the tool. Once again, the third challenge of Sarikaya et al, data design, is not verified, as for a new version the team is requesting more data as they believe the way the dashboard is organized prevents the problem of having too much information available. The sixth goal, however, confirms the first and second challenges, end-user flexibility and visual, analytic and data literacy, as the team believes different users with lower literacy levels might benefit from an improved interface designed to guide and help new users.

#### 4.2.5. RQ2

Being the person who developed the dashboard and is most familiar with it and its processes and given my background in computer science, I can confirm all these objectives are possible on a technical level, however some are more complex and will take considerably more time than others. The more ambitious one is number 5: Expand dashboard to incorporate other business areas, and the most achievable ones are number 6: Improve the interface to help new users, and number 7: Improve the interface design to make it more appealing. However, number 1: Record and display history to evaluate clients' evolution and the impact of recommendations, and 2: Use data to develop a market benchmark, are also easily attainable. Therefore, it is possible to answer the second research question, **What developments should the dashboard go through in the future?:** as number 1 was requested by the majority of the team and can realistically be quickly completed, as well as due to the importance attributed to it by the stakeholders, it should be the next step in this dashboard's development. It should then be followed by number 2, as the first one's development will contribute to the second's, and because of the value it will give GroupM's clients. Afterwards it would be best to re-

evaluate and re-prioritize these objectives, nevertheless I can conclude that before monetizing and expanding to other markets (objective 4), it would be advantageous to further develop Page Importance (objective 3). The reason is I believe the possibility of prioritization of issues, which is possible due to the combination of different sources and calculated metrics, namely the SEO Score and the Page Importance, is one of the most valuable benefits of this dashboard. Thus, showing a more advanced version of this metric than the basic one that currently exists will likely help achieve objective 4.

## 5. Conclusions and Recommendations

This work adds to the body of literature on business intelligence and dashboards, in particular with a specific case of one dashboard at GroupM Portugal. Regarding **RQ1**, it was possible to corroborate: the major uses of dashboards in business organizations are decision support, improvement of performance, creation of business value and communication (Sarıkaya et al., 2019); and two of the major key factors for dashboard adoption, use, and success are the IS resources and capabilities, and its user's skills and experience of the tool. Furthermore, it was verified that the users' visual, analytic and data literacy can present a barrier to the use of a dashboard (Sarıkaya et al., 2019). No evidence was found to confirm the other three barriers in this case: end-user flexibility, data design and social impact.

Based on this work's findings, this dashboard presents an opportunity for growth for the company and should be further developed, starting with the recording and display of history to allow the evaluation of clients' evolution and the impact of the SEO team's recommendations. In the future, when a more advanced version is available, it should be expanded into other markets and eventually other business areas. I recommend studying other opportunities inside the company to create similar BI systems due to the great feedback this

dashboard received. Most barriers identified in the literature were overcome due to my high visual, analytic and data literacy as the author and the tool was adapted to the team's work and necessities as they were consulted and involved in the development process. Therefore, I propose following a similar approach when developing a new dashboard or other BI system in the future. Due to the importance of IS systems stated in the literature and verified in this case study by the obstacles posed by the platform used to create this dashboard, I advise an investigation on the possibility and benefits of another BI or visualization tool. Lastly, the success of this project is attributable in no small way to the visual, analytic and data literacy of the people involved: me, the author, and the SEO team, the users. Without this knowledge, the barriers identified in the literature would likely have been verified, and this dashboard would not have been considered as useful by its users. Therefore, I advise the company to increase its investment in this area by training current employees with lower levels of data literacy, likely the ones that have social sciences as an academic background, and hire and retain those who possess this uncommon and powerful knowledge in the marketing industry. This way, the bridge between marketing and tech will keep becoming smaller and there will be a better use of data and more value created in the company. I believe this is the biggest contribution of this work to GroupM: the level of visual, analytic and data literacy of its employees is crucial to the company's technological innovation capabilities and competitiveness in the field of digital media, which is rapidly becoming very valuable in the broader media industry.

There are two limitations in this case study: this is only one case of one dashboard in one company, and the person conducting the study and interviews was the one that created the dashboard, and the interviewees knew it. Although they were put at ease to talk about their experience with the dashboard, it cannot be ruled out the possibility that there was some bias on the researcher's part or politically correct answers on the participants' part.

This study opens the possibility of further research as the dashboard can evolve, as outlined with **RQ2**, and a future version or replication to another business area could be evaluated in the future. The possible expansion to other markets also presents the opportunity of replicating this study for other SEO teams in different cultures. In the future, it would be relevant to conduct a similar study in other companies. I recommend the execution of more studies on how users perceive the usefulness of dashboards in order to understand how to improve them to fill the gap on what literature understands to be one of the main barriers of its adoption, use and success: usefulness to those that actually use dashboards.

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## 7. Appendices

### 7.1. Appendix 1: Global Media Investment Industry: 2014-2026 (GroupM, 2021)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
<b>TV / PRO. VIDEO</b>	\$170,817.7	\$169,222.8	\$171,186.1	\$167,730.7	\$168,479.0	\$167,030.0	\$144,081.9	\$160,999.4	\$163,863.5	\$167,594.4	\$170,403.6	\$173,280.0	\$175,350.9
• Growth	2.9%	-0.9%	1.2%	-2.0%	0.4%	-0.9%	-13.7%	11.7%	1.8%	2.3%	1.7%	1.7%	1.2%
• Share	37.5%	35.6%	33.9%	30.9%	28.5%	26.0%	23.1%	21.1%	19.6%	18.8%	18.0%	17.3%	16.7%
<b>AUDIO</b>	31,088.7	31,423.1	31,662.1	32,127.5	31,600.3	31,638.1	23,211.5	26,827.2	28,548.3	28,980.7	29,114.0	29,130.5	29,248.9
• Growth	0.1%	1.1%	0.8%	1.5%	-1.6%	0.1%	-26.6%	15.6%	6.4%	1.5%	0.5%	0.1%	0.4%
• Share	6.8%	6.6%	6.3%	5.9%	5.4%	4.9%	3.7%	3.5%	3.4%	3.3%	3.1%	2.9%	2.8%
<b>NEWSPAPERS</b>	67,317.2	61,607.7	55,880.7	51,602.3	46,815.7	42,830.4	30,574.4	31,371.6	29,769.8	28,725.6	27,577.8	26,561.7	25,828.6
• Growth	-7.7%	-8.5%	-9.3%	-7.7%	-9.3%	-8.5%	-28.6%	2.6%	-5.1%	-3.5%	-4.0%	-3.7%	-2.8%
• Share	14.8%	13.0%	11.1%	9.5%	7.9%	6.7%	4.9%	4.1%	3.6%	3.2%	2.9%	2.7%	2.5%
<b>MAGAZINES</b>	35,466.7	33,101.2	30,231.2	28,209.8	26,112.6	24,593.9	18,813.9	17,854.4	16,447.2	15,410.1	14,489.1	13,751.2	13,111.0
• Growth	-6.6%	-6.7%	-8.7%	-6.7%	-7.4%	-5.8%	-23.5%	-5.1%	-7.9%	-6.3%	-6.0%	-5.1%	-4.7%
• Share	7.8%	7.0%	6.0%	5.2%	4.4%	3.8%	3.0%	2.3%	2.0%	1.7%	1.5%	1.4%	1.2%
<b>OUTDOOR</b>	29,995.3	31,605.6	33,516.5	36,604.8	39,417.9	39,319.8	29,029.2	33,984.0	39,035.1	41,996.0	44,825.0	47,265.3	49,471.1
• Growth	3.4%	5.4%	6.0%	9.2%	7.7%	-0.2%	-26.2%	17.1%	14.9%	7.6%	6.7%	5.4%	4.7%
• Share	6.6%	6.6%	6.6%	6.8%	6.7%	6.1%	4.7%	4.5%	4.7%	4.7%	4.7%	4.7%	4.7%
<b>CINEMA</b>	1,739.9	2,044.1	2,110.9	2,165.4	2,541.4	2,716.7	569.2	722.1	1,679.0	2,087.7	2,195.7	2,274.5	2,346.8
• Growth	-1.3%	17.5%	3.3%	2.6%	17.4%	6.9%	-79.0%	26.9%	132.5%	24.3%	5.2%	3.6%	3.2%
• Share	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>DIGITAL</b>	118,911.3	146,729.1	180,275.9	223,662.4	275,397.5	334,897.0	376,691.6	491,445.6	557,552.9	606,303.8	659,558.4	707,655.9	754,595.6
• Growth	20.7%	23.4%	22.9%	24.1%	23.1%	21.6%	12.5%	30.5%	13.5%	8.7%	8.8%	7.3%	6.6%
• Share	26.1%	30.8%	35.7%	41.3%	46.6%	52.1%	60.5%	64.4%	66.6%	68.0%	69.6%	70.8%	71.9%
<b>-SEARCH</b>	62,090.5	70,861.3	81,112.2	93,722.6	108,528.9	122,322.4	128,283.0	162,098.0	185,500.9	198,949.1	216,050.8	227,370.6	243,903.2
• Growth	19.9%	14.1%	14.5%	15.5%	15.8%	12.7%	4.9%	26.4%	14.4%	7.2%	8.6%	5.2%	7.3%
• Share	13.6%	14.9%	16.1%	17.3%	18.4%	19.0%	20.6%	21.2%	22.2%	22.3%	22.8%	22.7%	23.2%
<b>-EX-SEARCH</b>	56,820.8	75,867.8	99,163.7	129,939.8	166,868.6	212,574.6	248,408.6	329,347.6	372,052.0	407,354.7	443,507.6	480,285.3	510,692.5
• Growth	21.8%	33.5%	30.7%	31.0%	28.4%	27.4%	16.9%	32.6%	13.0%	9.5%	8.9%	8.3%	6.3%
• Share	12.5%	15.9%	19.6%	24.0%	28.3%	33.1%	39.9%	43.2%	44.5%	45.7%	46.8%	48.0%	48.6%
<b>TOTAL ADVERTISING</b>	\$455,336.7	\$475,733.5	\$504,863.5	\$542,102.9	\$590,364.5	\$643,025.9	\$622,971.7	\$763,204.4	\$836,895.8	\$891,098.3	\$948,163.5	\$999,919.0	\$1,049,952.8
• Growth	4.1%	4.5%	6.1%	7.4%	8.9%	8.9%	-3.1%	22.5%	9.7%	6.5%	6.4%	5.5%	5.0%

### 7.2. Appendix 2: Portuguese Media Investment Industry: 2012-2026 (GroupM, 2021)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
<b>TV</b>	\$339.3	\$313.2	\$337.3	\$341.8	\$357.7	\$362.1	\$363.1	\$360.9	\$328.5	\$368.8	\$391.1	\$414.6	\$439.6	\$466.0	\$494.0
• Growth	-17.5%	-7.7%	7.7%	1.3%	4.7%	1.2%	0.3%	-0.6%	-9.0%	12.3%	6.0%	6.0%	6.0%	6.0%	6.0%
• Share	44.8%	43.8%	42.7%	42.5%	42.3%	42.0%	40.5%	38.7%	43.5%	44.4%	44.5%	44.5%	44.5%	44.5%	44.4%
<b>Audio</b>	48.6	42.6	47.1	47.0	50.2	53.0	54.3	59.0	42.3	42.2	44.0	45.9	47.9	49.9	52.1
• Growth	-11.1%	-12.3%	10.4%	-0.1%	6.7%	5.6%	2.4%	8.7%	-28.3%	-0.2%	4.1%	4.5%	4.3%	4.2%	4.2%
• Share	6.4%	6.0%	6.0%	5.9%	5.9%	6.2%	6.1%	6.3%	5.6%	5.1%	5.0%	4.9%	4.8%	4.8%	4.7%
<b>Newspapers</b>	70.1	57.6	59.2	55.0	45.1	41.1	36.8	33.9	25.4	27.2	29.8	32.8	35.5	35.5	35.5
• Growth	-19.7%	-17.8%	2.8%	-7.1%	-17.9%	-8.8%	-10.5%	-8.0%	-22.2%	3.3%	9.3%	10.3%	8.3%	0.0%	0.0%
• Share	9.2%	8.1%	7.5%	6.8%	5.3%	4.8%	4.1%	3.6%	3.5%	3.3%	3.4%	3.5%	3.6%	3.4%	3.2%
<b>Magazines</b>	47.5	44.9	47.2	46.0	42.1	38.9	33.5	30.6	17.4	18.3	20.0	22.0	23.9	23.9	23.9
• Growth	-22.7%	-5.3%	5.2%	-2.7%	-8.5%	-7.4%	-14.0%	-8.5%	-43.2%	5.1%	9.3%	10.3%	8.3%	0.0%	0.0%
• Share	6.3%	6.3%	6.0%	5.7%	5.0%	4.5%	3.7%	3.3%	2.3%	2.2%	2.3%	2.4%	2.4%	2.3%	2.1%
<b>Outdoor + Cinema</b>	190.9	189.4	217.6	210.5	224.0	224.9	241.9	266.7	171.7	172.4	178.7	185.5	192.5	200.5	208.6
• Growth	-10.5%	-1.3%	15.6%	-3.3%	6.4%	0.4%	7.6%	10.2%	-35.6%	0.4%	3.6%	3.8%	3.8%	4.2%	4.0%
• Share	25.2%	26.3%	27.6%	26.2%	26.5%	26.1%	27.0%	28.6%	22.7%	20.8%	20.3%	19.9%	19.5%	19.1%	18.8%
<b>Total Internet</b>	61.7	68.7	81.1	103.3	125.6	141.4	166.3	182.2	168.7	201.0	215.4	230.5	248.4	272.2	298.5
• Growth	-2.8%	11.4%	18.0%	27.3%	21.6%	12.5%	17.6%	9.6%	-7.4%	19.1%	7.2%	7.0%	7.7%	9.6%	9.7%
• Share	8.1%	9.6%	10.3%	12.9%	14.9%	16.4%	18.6%	19.5%	22.3%	24.2%	24.5%	24.7%	25.1%	26.0%	26.8%
<b>Total</b>	\$758.1	\$715.6	\$789.7	\$803.5	\$844.8	\$861.4	\$895.9	\$933.4	\$754.9	\$829.9	\$878.9	\$931.5	\$987.8	\$1,048.1	\$1,112.6
• Growth	-15.0%	-5.6%	10.4%	1.7%	5.1%	2.0%	4.0%	4.2%	-19.1%	9.9%	5.9%	6.0%	6.0%	6.1%	6.2%

### 7.3. Appendix 3: Ranking de Agências de Meios Portugal (GroupM, 2022)

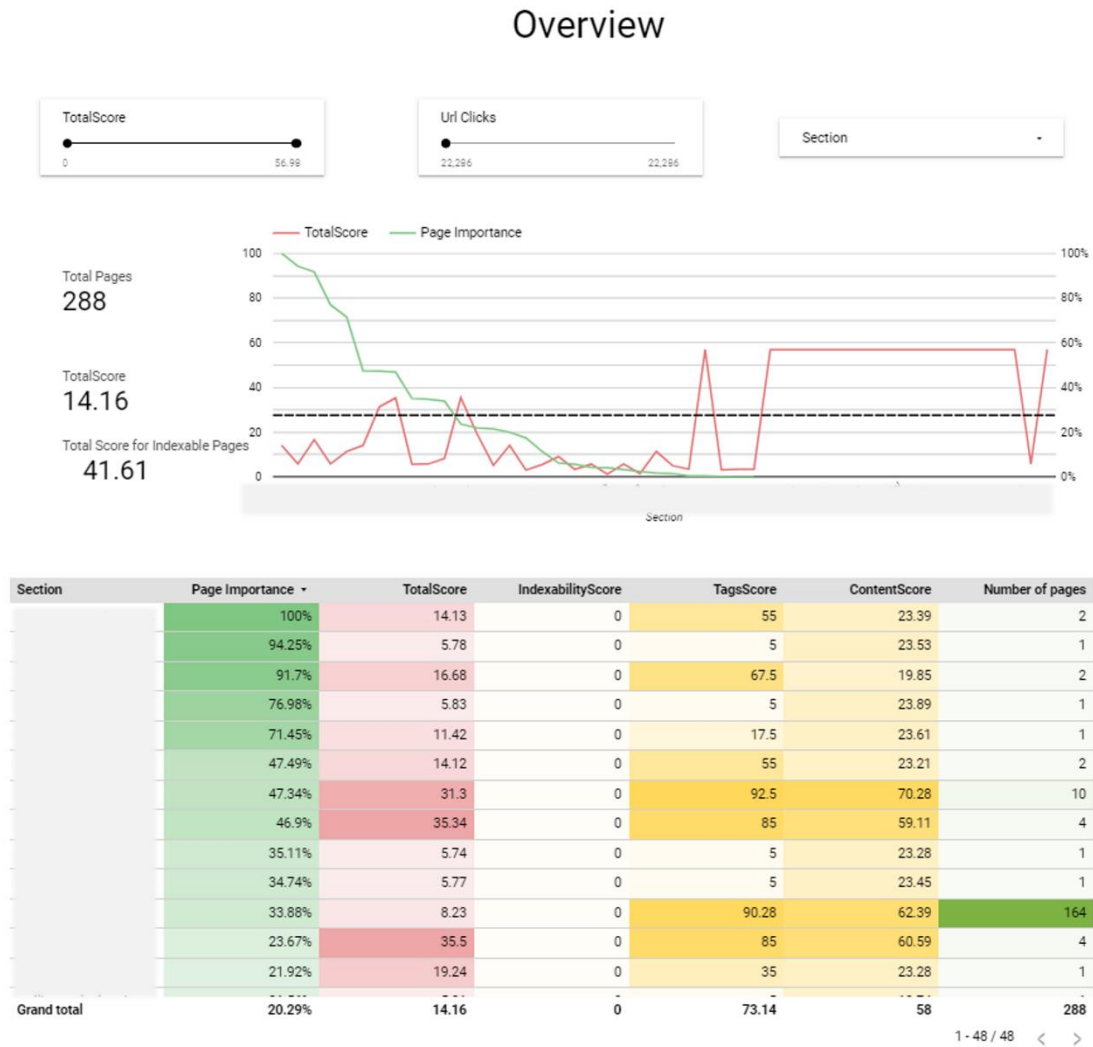
#### Ranking Agências de Meios

	2019			2020			2021				
	Pos.	Invest. (€)	Shr. (%)	Var. %	Pos.	Invest. (€)	Shr. (%)	Var. %	Pos.	Invest. (€)	Shr. (%)
DIRECTOS/INDEFINIDO		1 909 657 257	16%		2 071 407 418	18%	8%		2 231 607 147	18%	8%
CARAT	4	1 107 465 618	9%		1 193 087 091	11%	8%	1	1 416 419 452	11%	19%
ARENA	3	1 147 914 722	10%		1 086 908 320	10%	-5%	2	1 369 762 755	11%	26%
WAVEMAKER	2	1 220 983 931	10%		1 166 739 383	10%	-4%	3	1 087 536 191	9%	-7%
INITIATIVE	5	1 009 365 480	9%		807 069 161	7%	-20%	4	1 013 479 695	8%	26%
OMD	1	1 258 429 161	11%		1 043 205 993	9%	-17%	5	939 827 590	8%	-10%
MINDSHARE	6	754 332 578	6%		844 207 082	7%	12%	6	656 965 658	5%	-22%
HAVAS MEDIA	8	647 564 937	5%		491 576 551	4%	-24%	7	589 935 611	5%	20%
STARCOM MEDIAVEST GROUP	7	739 232 345	6%		576 749 492	5%	-22%	8	503 185 593	4%	-13%
PHD	11	283 143 996	2%		375 741 146	3%	33%	9	470 318 714	4%	25%
MEDIACOM PORTUGAL	9	540 588 161	5%		391 894 854	3%	-28%	10	450 825 404	4%	15%
ZENITH	10	491 627 339	4%		331 668 329	3%	-33%	11	414 234 080	3%	25%
NOVA EXPRESSAO	12	238 578 076	2%		248 652 421	2%	4%	12	343 910 422	3%	38%
UNIVERSAL MCCANN	13	231 945 066	2%		195 940 606	2%	-16%	13	322 035 251	3%	64%
STUDIOM					214 664 377	2%		14	271 025 184	2%	26%
MEDIAGATE	15	50 172 733	0%		117 667 806	1%	135%	15	161 009 340	1%	37%
COMON	16	48 863 998	0%		45 844 360	0%	-6%	16	56 687 416	0%	24%
SIX:AM	17	24 952 275	0%		56 906 170	1%	128%	17	54 763 906	0%	-4%
MARKETIVIDADE	18	4 154 254	0%		3 589 577	0%	-14%	18	3 882 255	0%	8%
OUTRIDER SM	19	2 886 981	0%		285 630	0%	-90%	19	1 209 223	0%	323%
EXECUTIVE MEDIA	14	92 330 201	1%								
<b>Total</b>		<b>11 804 189 107</b>	<b>100%</b>		<b>11 263 805 765</b>	<b>100%</b>	<b>-5%</b>		<b>12 358 620 889</b>	<b>100%</b>	<b>10%</b>

Grupo	Agência
GroupM	Wavemaker
	Mindshare
	Mediacom
	StudioM
	Outrider SM
	Executive Media
Havas Media Group	Arena
	Havas Media
Omnicom Group	OMD
	PHD
IPG Mediabrand	Initiative
	Universal McCann
Dentsu AEGIS Network	Carat
Publicis Media	Starcom Mediavest Group
	Zenith

## 7.4. Appendix 4: Dashboard Screenshots

### 1. Overview Page



## 2. Indexability Page

# Indexability

Indexability TotalScore  0 56.98 Uri Clicks  22.286 22.286 Section

Section	Page Importance	TotalScore	IndexabilityScore	TagsScore	ContentScore	Address
	100%	14.13	0	55	23.39	2
	94.25%	5.78	0	5	23.53	1
	91.7%	16.68	0	67.5	19.85	2
	76.98%	5.83	0	5	23.89	1
	71.45%	11.42	0	17.5	23.61	1
	47.49%	14.12	0	55	23.21	2
	47.34%	31.3	0	92.5	70.28	10
	46.9%	35.34	0	85	59.11	4
	35.11%	5.74	0	5	23.28	1
	34.74%	5.77	0	5	23.45	1
	33.88%	8.23	0	90.28	62.39	164
<b>Grand total</b>	<b>20.29%</b>	<b>14.16</b>	<b>0</b>	<b>73.14</b>	<b>58</b>	<b>288</b>

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Distribuição de StatusCode no site



Distribuição de StatusCode em URLs Non-Indexable



Distribuição de IndexabilityStatus em URLs 200 Non-Indexable



Section	2xx	Grand total
	164	164
	31	31
	15	15
	15	15
	10	10
	4	4
	4	4
	2	2
	2	2
	2	2
	2	2
	1	1
<b>Grand to...</b>	<b>288</b>	<b>288</b>

Address

Address	Section	Status_Code	Indexability	IndexabilityScore	TotalScore	Page Importance
		200	Non-Indexable	0	0	3.87%
		200	Non-Indexable	0	0	0%
		200	Indexable	0	5.55	2.2%
		200	Indexable	0	9.11	1.2%
		200	Indexable	0	3.05	3.36%
		200	Indexable	0	3.48	0%
		200	Indexable	0	28.26	19.32%

1 - 100 / 288 < >

Nota:  
Para ver por section (drill up): clicar na seta para cima  
Para ver por address (drill down): clicar na seta para baixo

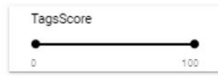
Address	Page Importance	TotalScore	IndexabilityScore	TagsScore	ContentScore
	100%	9.11	0	12.5	23.21
	28.04%	0	0	-	-
	19.32%	28.26	0	55	23.39

1 - 100 / 288 < >

### 3. HTML Tags Page

## HTML Tags

\* Only indexable pages



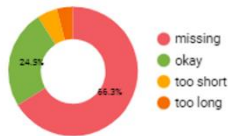
Section

Section	Page Importance	TotalScore	TagsScore	TitleScore	DescriptionScore	H1Score
	100%	49.98	90.28	91.67	88.89	88.89
	57.94%	28.26	55	50	50	75
	54.61%	5.78	5	0	0	25
	53.13%	33.35	67.5	75	50	75
	44.61%	5.83	5	0	0	25
	41.4%	11.42	17.5	25	0	25
	27.51%	28.23	55	50	50	75
	27.43%	52.17	92.5	91.67	91.67	95.83
	27.18%	47.12	85	83.33	83.33	91.67
	20.34%	5.74	5	0	0	25
	20.13%	5.77	5	0	0	25
	13.72%	47.34	85	83.33	83.33	91.67
<b>Grand total</b>	<b>23.99%</b>	<b>41.61</b>	<b>73.14</b>	<b>72.7</b>	<b>71.94</b>	<b>76.02</b>

1 - 48 / 48 < >

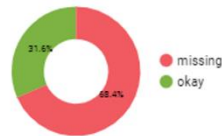
#### Titles

Score  
**73**



#### Descriptions

Score  
**72**



#### H1s

Score  
**76**



Nota: NumberOfTitle Duplicates=1 quer dizer que só há uma página com aquela Title (/Description/Title/H1).



Nota: linhas a vermelho indicam conjunto de páginas com a mesma Title/Description/H1.

NumberOfTitle Duplicates	Number of Addresses
31	1
5	1
2	6
1	25
null	65

NumberOfDescription Duplicates	Number of Addresses
5	1
2	6
1	24
null	67

NumberOfH1 Duplicates	Number of Addresses
5	1
2	6
1	25
null	66

Address  
 Equals

Section	Address	Title Status	Title Duplicates	Description Status	Description Duplicates	H1 Status	H1 Duplicates	H1 Multiple Status	TagsScore	TotalScore	Page Importance
		missing	-	missing	-	missing	-	okay	100	56.98	1.06%
		missing	-	missing	-	missing	-	okay	100	49.44	0%
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	49.44	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-

Address	Title Status	NumberOfTitle Duplicates	Title_1	Title_1 Length	Description Status	NumberOfDescription Duplicates	Meta_Description_1	Meta_Description_1 Length	H1 Status	NumberOfH1 Duplicates	H1_1	H1_1 Length
	missing	-		0	missing	-		0	missing	-		0
	okay	1		37	okay	1		145	okay	1		7
	okay	1		46	okay	1		142	okay	1		30
	okay	1		33	okay	1		138	okay	1		18
	okay	1		38	okay	1		138	okay	1		28
	okay	1		55	okay	1		145	okay	1		43
	okay	1		43	okay	1		139	okay	1		68
	okay	2		36	okay	2		135	okay	2		49
	missing	-		0	missing	-		0	missing	-		0
	missing	-		0	missing	-		0	missing	-		0

Nota: Para ver por section (drill up): clicar na seta para cima  
 Para ver por address (drill down): clicar na seta para baixo

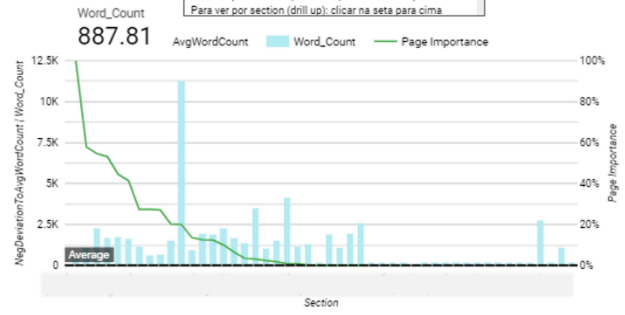
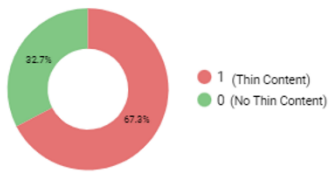
Address	Page Importance	TotalScore	IndexabilityScore	TagsScore	ContentScore
	100%	9.11	0	12.5	23.21
	19.32%	28.26	0	55	23.39
	18.21%	5.78	0	5	23.53
	17.71%	33.35	0	67.5	19.85
	14.87%	5.83	0	5	23.89



## Word Count

Nota:  
 Para ver por address (drill down): clicar na seta para baixo  
 Para ver por section (drill up): clicar na seta para cima

Distribuição de URLs com Thin Content (others)



Address  
 Equals

0 11,255 0 100

Address	Section	Word_Count	NegDeviationToAvgWordCount	Page Importance
		0	100	-
		238	73.19	-
		238	73.19	-
		238	73.19	-
		238	73.19	-
		238	73.19	-
		238	73.19	-

## 5. Interaction Example

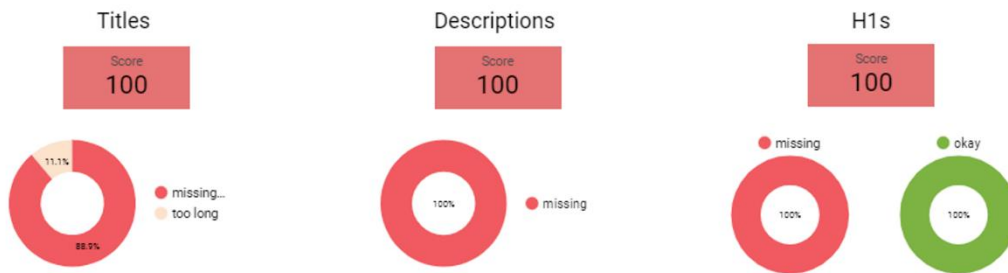
### HTML Tags

\* Only indexable pages



Section	Page Importance	TotalScore	TagsScore	TitleScore	DescriptionScore	H1Score
	100%	56.98	100	100	100	100
	0%	55.1	100	100	100	100
	null	56.98	100	100	100	100
	null	56.98	100	100	100	100
	null	56.98	100	100	100	100
	null	56.98	100	100	100	100
	null	56.98	100	100	100	100
	null	56.98	100	100	100	100
	null	56.98	100	100	100	100
	null	56.98	100	100	100	100
	null	56.98	100	100	100	100
	null	56.98	100	100	100	100
Grand total	50%	56.29	100	100	100	100

1 - 22 / 22 < >



Address  
 Equals

Section	Address	Title Status	Title Duplicates	Description Status	Description Duplicates	H1Status	H1 Duplicates	H1 Multiple Status	TagsScore	TotalScore	Page Importance
		missing	-	missing	-	missing	-	okay	100	49.44	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	49.44	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	49.44	-
		missing	-	missing	-	missing	-	okay	100	56.98	-
		missing	-	missing	-	missing	-	okay	100	49.44	-
		missing	-	missing	-	missing	-	okay	100	56.98	-

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## 7.5. Appendix 5: Interview Guide

Hello, my name is Raquel Casteleiro and I'm a Masters student at Nova SBE. I am researching the usefulness of the SEO Technical Dashboard you have been using and the possibilities for its future development. To carry out this research, I am conducting interviews such as this one. There are no right or wrong answers, you are free to say absolutely everything that comes to your mind and your answers will be extremely helpful, so thank you for your time. For the purpose of analyzing these interviews later, I will record them in audio format. All data will be anonymized, which means no one will be able to track any answers to you. That being said, I will ask one introductory question to register your consent. Do you consent to recording this interview?

- Yes
- No (finish the interview)

Thank you very much! Let's start.

### RQ1

1. For what do you use this dashboard?
2. How did this Dashboard impact your work either positively or negatively?
3. What barriers do you feel exist to your use of the dashboard?
  - a. Do you believe the dashboard provides you with the necessary analytical support and flexibility?
  - b. How do you feel your visual, analytic and data literacy affects the way you use the dashboard?
  - c. Do you think the dashboard provides too little, too much or the right amount of data for what you need?
  - d. Do you trust the data that is presented in the dashboard?

## RQ2

4. How do you think the dashboard could be improved and/or expanded?

The interview has come to an end, it was very interesting to hear about your experience and extremely helpful for my research. Thank you again for your availability!

### **7.6. Appendix 6: Interviewees' Profiles**

<b>Interviewee</b>	<b>I1</b>	<b>I2</b>	<b>I3</b>	<b>I4</b>
<b>Gender</b>	Male	Female	Male	Female
<b>Age</b>	35	37	26	23
<b>Job Role</b>	SEO Team Leader	SEO Senior Consultant	SEO Junior Consultant	SEO Trainee
<b>Academic Background</b>	Bsc Marketing; Post-graduation Digital Marketing; Post-graduation Data Science	Bsc Communication Sciences; Msc Marketing; Post-graduation Data Science applied to Marketing	Bsc Social and Cultural Communication; Msc Marketing and Advertising	Bsc Social and Cultural Communication; Post-Graduation Creative Advertising; Msc Marketing and Innovation
<b>Job Market Experience</b>	12 years	16 years	2 years	4 months
<b>SEO Experience</b>	7 years	5 years	2 years	4 months

## 7.7. Appendix 7: Content Analysis Grid Excerpt

		I1	I3
	Q1	<p>I essentially use it for proposals. To be able to get information while i'm on calls with clients or when i'm making the proposal, to tell them "look you have problems here, we need to fix this or that". It provides information quickly without incurring extra costs or spending too much time on a task that is not billable. essentially I use it to give me more information, more inputs on how the website is doing, to show the problems to the client so they can see if they really need the SEO team to fix those problems.</p>	<p>I use it to detect problems on clients' websites and create recommendations. I look at the pages that are worse technically or I look at the most important pages or sections to see what problems they have.</p>
RQ1	Q2	<p>One of the added values of this dashboard is the possibility to automate some processes in the team that "free" time for more value-added work. We can be more efficient and effective, which at the end of the day means profit. With this dashboard we are able to draw insights faster, in much more detail and for a larger number of pages/errors, allowing us to look at other aspects of SEO that can be optimized.</p> <p>I believe using data from Google Search Console and the crawler simultaneously is the element that sets the tool apart, it allows us to prioritize our work with our clients in a way we were not able to before, (...) by giving us a clearer picture of the balance between the most important pages and the ones that are worse in terms of technical SEO.</p> <p>Although human sensitivity is highly relevant and different from person to person, the fact that we can do analysis consistently and always in the same way or based on the same assumptions, gives us greater confidence in the output. This also means we are more easily able to scale the process to different customers.</p> <p>Using this dashboard, it was possible to show the team different ways of working and thereby "open" their minds to other possibilities</p>	<p>I can visualize the data through pre-built graphs and tables, which in turn also allows me to look at the data in a different way and get better insights than by just looking at numbers.</p> <p>In an organized way, I can group, filter, and analyze data that used to take me longer to organize.</p> <p>When data transformation and processing is automated, we reduce the likelihood of errors that can lead to faulty analysis.</p>