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Human Resources Analytics Module at Quidgest: One more step for Human Resources to become a true Strategic Partner

Miguel Fontes de Araújo Gaspar

Master's Degree in Human Resources Management and Organizational Consultancy

Supervisor:
Doctor Elsa Maria Dias Dinis, Visiting Professor,
Iscte-IUL

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BUSINESS
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Department of Human Resources and Organizational Behavior

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Abstract

Analytics has been a source of competitive advantage due to improved decision-making processes in several business areas. Organizations have reported gains in efficiency and effectiveness based on the implementation of data-driven strategies. However, Human Resources (HR) professionals have been struggling to implement Analytics processes and are missing out on the opportunity of using data to improve organizational performance and truly become a Business Strategic Partner.

This Enterprise Project aims to contribute to shortening that gap. It sets out to gather and elicit business, user, functional, and nonfunctional requirements for a new Human Resources Analytics Module (HRAM) at Quidgest, a Portuguese Technological Consultancy company that develops Human Resources Information Systems. The gathering and elicitation of requirements were done through Interviews, a Questionnaire, and 2 Joint Application Development (JAD) Sessions. A Value Proposition Canvas was developed to convey a fit between the system's main functionalities and HR Professionals' needs based on those requirements.

The relevance of this project is two-folded: First, when developed, the new Analytics Module can become a new revenue stream for Quidgest and a way to maintain and improve its competitiveness in the market; Second, HR Professionals may find a new tool that meets their needs towards implementing Analytics processes and take a step forward in becoming a Strategic Partner.

The conclusion of this project also sets out to suggest the next steps for the Module Development and implementation.

Keywords: Human Resources; Analytics; Information Systems; Information Technology (IT); System Development Life Cycle;

JEL Classification System: O15 (Human Resources); O32 (Management of Technological Innovation and R&D)

Resumo

O uso de *Analytics* tem sido uma fonte de vantagem competitiva devido à melhoria dos processos de tomada de decisão. As organizações relatam ganhos em eficiência e eficácia com base na implementação de estratégias baseadas em análise de dados. No entanto, os profissionais de Recursos Humanos (RH) têm se debatido para implementar processos analíticos e estão a perder a oportunidade de usar os seus dados para melhorar o desempenho organizacional e se tornarem realmente *Strategic Business Partners.*

Este projeto em empresa visa colmatar essa lacuna. Pretende-se recolher e clarificar requisitos de negócio, utilizador, funcionais e não funcionais para um novo Módulo de *Human Resources (HR) Analytics* na Quidgest, uma constultora tecnológica portuguesa que desenvolve Sistemas de Informação de RH. A recolha e a clarificação de requisitos foi feita através de entrevistas, um questionário, e 2 *Joint Application Development Sessions*. De seguida, foi desenvolvido um *Value Proposition Canvas*, que mostra como há um *fit* entre as principais funcionalidades do sistema e as necessidades dos profissionais de RH nesta área.

A relevância deste projeto prende-se em dois aspetos: primeiro, o novo Módulo de *Analytics* pode tornar-se uma nova fonte de receita para a Quidgest e uma forma de manter e melhorar sua competitividade; Em segundo lugar, os profissionais de RH podem encontrar uma nova ferramenta que responda às suas necessidades de implementação de processos analíticos e dar um passo em frente para se tornarem um *Business Partner*.

A conclusão deste projeto sugere os próximos passos para o Desenvolvimento do Módulo de *Analytics.*

Palavras-Chave: Recursos Humanos; Analytics; Sistemas de Informação; Tecnologias da Informação e Comuniacção (TIC); System Development Life Cycle;

JEL Classification System: O15 (Human Resources); O32 (Management of Technological Innovation and R&D)

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List of Abbreviations and Acronyms

The following table conveys the various abbreviations and acronyms used throughout this project.

Abreviation/Acronym	Meaning
CEO	Chief Executive Officer
ETL	Extract, Transform, Load
HR	Human Resources
HRAM	Human Resources Analytics Module
HRIS	Human Resources Information System
HRM	Human Resources Management
JAD	Joint Application Development
SDLC	Systems Development Life Cycle

Chapter 1: Introduction

1.1. Human Resources Analytics

Mortenson et al. (2015) define the discipline of "*Analytics*" as the intersection of Technology, Quantitative Methods, and Decision Making to organize, analyze and interpret the increasing amount of data available in various areas of business activity (Figure in Appendix G, Figure 11). Today, we see applications of Analytics in areas such as logistics and supply chain (Souza, 2014; Wang et al., 2016), auditing (Gepp et al., 2017), marketing (Wedel & Kannan, 2016), and finance (Mitra & Mitra, 2012).

With the amount of workforce data being collected and managed with more and more tools, the question of how to analyze and make predictions about this data to improve organizational performance is coming into focus (Agarwal et al., 2018; Bassi, 2011; Chalutz Ben-Gal, 2019; Isson & Harriott, 2016).

Although there are success stories of HR Analytics, unfortunately, the HR function faces challenges and barriers in its successful implementation. As Angrave et al. (2016) mention, "*the central problem is that (…) the ideas about HR data and analytics (…) have not penetrated the thinking of much of the HR profession. Many HR professionals are skeptical because they question whether people can be reduced to metrics."* Furthermore, the authors add that *"the HR function lacks the skills, knowledge, and insight to ask the right questions of the HR data they have at their disposal*" (p. 4). Moreover, the lack of technological tools targeted for HR professionals to perform better Analytics processes is cited as one of the main barriers to the advancement of the field (Angrave et al., 2016; Fernandez & Gallardo-Gallardo, 2020). The lack of HR data analysis is one of the missing pieces for the HR function to become significantly closer to being a Strategic Partner (Lawler et al., 2004; Mondore et al., 2011). Hence, this project aims to contribute to HR having a more strategic role.

1.2. Objectives of the Enterprise Project

The technology available and the Analytical skills of HR professionals are some of the main barriers to a better HR Analytics implementation. This project sets to fulfill the interest of HR professionals and executives to have a more data-driven approach towards HR. Hence, the purpose of this Enterprise Project is to build a system proposal that justifies the endeavors needed to develop an HRAM at Quidgest (presented in chapter section 4.1). Quidgest is a Portuguese Technological Consultancy company that develops Management Information Systems through extreme low code development.

Through the development of the HRAM, this project seeks to contribute for HR to become closer to being a *Business Strategic Partner* by providing the necessary tools for HR to implement Analytics processes.

The system proposal is presented throughout

Chapter 4: Implementation. It shall answer the question “Why should Quidgest build an HRAM?” and identify the main business, user, functional, and nonfunctional requirements. The findings and outputs of the project are summarized in a Value Proposition Canvas (Osterwalder et al., 2014), in section 4.2, which condenses the main characteristics of the HRAM and the Customer Profile of HR Professionals. The methodology used readily present a fit between the HRAM and HR professionals’ (and organizations') needs.

These are the objectives sought to be fulfilled throughout this project:

Objective 1: Present what is HR Analytics and how it adds value to Organizations.

Objective 2: Present Quidgest and how the new HRAM is aligned with its business strategy.

Objective 3: Gather business, users, functional, and nonfunctional requirements through interviews, questionnaires, and 2 JAD Sessions.

Objective 4: Propose the foundations of an HRAM by analyzing and eliciting its requirements.

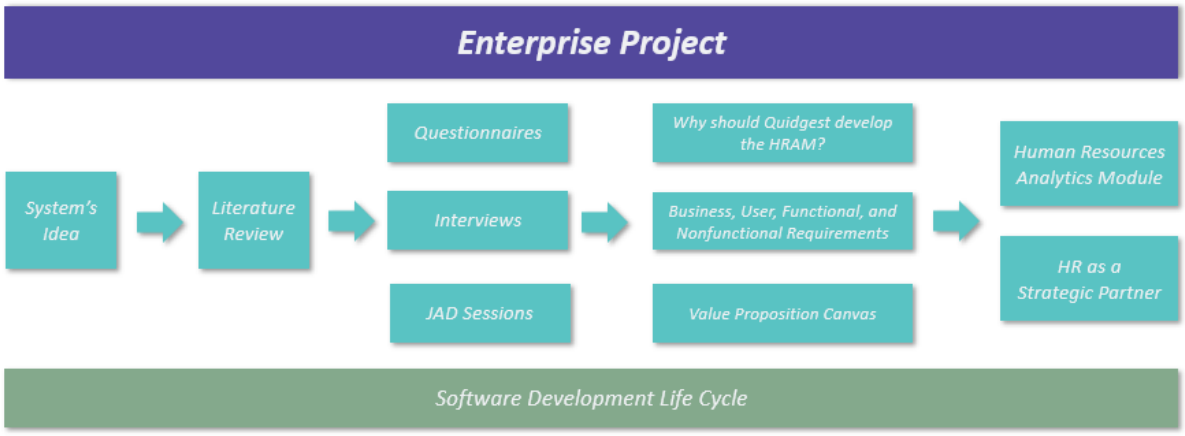
Objective 5: Through the research output of this project, show why it is relevant for Quidgest to develop it.

1.3. **Structure**

The following steps were taken to fulfill the objectives mentioned above:

1. Present a literature review on why HR Analytics is relevant, what it is, its main applications, and challenges and barriers HR has faced in its implementation. The literature review will also serve as one of the key points to plan and define the foundations of the HRAM.
2. Gather and elicit Business, Users, Functional, and Nonfunctional requirements, through Interviews, a Questionnaire, and two JAD Sessions.
3. Introduce Quidgest and its HRIS (Human Resources Information System) and how it is relevant for the organization to develop an HRAM.
4. Condense all the information gathered in a Value Proposition Canvas and show a fit between the HRAM and Customers/Users (HR Professionals).
5. Present a final list of users, functional, and nonfunctional requirements, which define the basis of the system.
6. Conclude the project by justifying why Quidgest should prioritize the development of an HRAM and define the most critical next steps.

Figure 1. Graphical representation of the Enterprise Project structure and objectives



The workflow, terminologies, and methodology used to develop this plan are based on the System Development Life Cycle framework presented by Dennis et al. (2012).

1.4. Why Quidgest?

Quidgest is a Portuguese Technological Consultancy company that develops management information systems for various business areas (Finance, Human Resources, Logistics, Cybersecurity, among others). Currently, Quidgest's HR Business Area offers several separated Modules of HRIS, such as Payroll, Training, Performance Appraisal, Attendance, and others. The data stored and managed in each Module is fully integrated. Therefore, there are good foundations to develop an HRAM since the core HR practices are already covered in terms of Information Systems.

Furthermore, HR Analytics is a practice that has been growing in interest, both in management and academic literature, for quite some time (Tursunbayeva et al., 2018b). It is only logical that Quidgest is interested in developing this Solution to stay competitive and answer market demands. Throughout section 1.5 it is conveyed the key reasons why it is relevant for Quidgest and its customers to start a project like this.

1.5. Project's Relevance

Organizations always have urgent priorities and projects, and Quidgest is no different. Therefore, tit is laid out why Quidgest should put the HRAM Project as one of the top priorities in the short/medium term, and at the same time contribute to the advancement of HR Analytics.

1.5.1. Human Resources is lagging on the Analytics revolution, but the interest to adopt the best practices is present.

Several business functions, such as finance, marketing, and sales, have adopted and utilized analytics to their favor. However, it is odd that HR has not leveraged analytics and take out the guesswork for

managing talent (Lawler et al., 2004; Marler & Boudreau, 2017). Especially when Human Capital costs account for, on average, "*20 to 70 percent of corporate expense*" (Fitz-enz, 2004, p.11).

Organizations are increasingly digitalized with improved HRIS systems that offer organizations bigger and better volumes of data about their personnel. Hence, there is the expectation that HR Analytics continues to grow its potential for increased organizational value (van der Togt & Rasmussen, 2017). Furthermore, this is especially relevant for Quidgest since its clients already possess an HRIS and organized sets of personnel data. Thus, the adaptability when starting HR Analytics processes is expected to be higher.

Additionally, a report which conveys the results of a survey with answers from over 10.000 business and HR Leaders worldwide states that 71 percent of the companies see "*People Analytics*" as an important/very important trend in HR (Bersin et al., 2017). According to Agarwal et al. (2018), "*the use of workforce data to analyze, predict, and improve performance has exploded in practice and importance over the last few years, with more growth on the horizon*" (p. 89). A survey developed in Portugal reports that 52% of its responders chose "*Technology Competencies (HR Analytics)*" as one of the top 3 areas their HR Teams need to reinforce their efforts. In the same report, 33% of the HR employees inquired chose the "*Utilization of KPIs and HR Analytics*" as one of the top 3 most important areas/tools for an HR Manager shortly (only topped by Employer Branding, Knowledge of the business, Change Management, and Strategic Alignment and Planning - which are all processes that can be improved through Analytics) (Chase, 2019).

Thus, there are good incentives for Quidgest to be a catalyzer of this "HR Analytics Revolution." The organization can benefit from improved financial performance and competitiveness in the market by supplying its customers with the necessary tools to better analyze their workforce data.

1.5.2. Although there is interest, Human Resources departments have been facing several challenges and barriers when implementing Analytics processes

While HR Leaders and researchers attribute increasing importance to implementing HR Analytics practices, its adoption is still shallow. Companies have reported struggling to move from operational reporting to more advanced and sophisticated analytics, such as multi-year workforce planning, correlating HR data to business performance, and how to use HR data to predict performance (Bersin et al., 2014).

According to a report that conveys data from the annual survey to US CEOs (Chief Executive Officer) by PricewaterhouseCoopers (PwC), only 9% stated that they proactively made predictions about their workforce. In the same report, 40% said they reactively used workforce data, typically via *ad hoc* reporting (Berisford et al., 2014).

In another survey involving 1.201 Senior HR Executives from 64 countries across 31 industries, almost 70% recognized the need for workforce transformation. In contrast, only about a third (37%) "*feel 'very confident' about HR's actual ability to transform and move them forward via key capabilities like analytics and AI*" (Bolton et al., 2019). These facts are encouraging for an Information Systems' Vendor because it is an opportunity to catalyze and support the implementation of Analytics processes.

1.5.3. Several case studies show that the use of Human Resources Analytics has a significant impact on business outcomes.

Best Buy identified that a 0.1% increase in employee engagement generated an increase of $100.000 US Dollars in each of their store's annual operating income. Google has been using Analytics to optimize its recruitment and selection process for years (Davenport et al., 2010). Feeley et al. (2008) discovered, through Social Network Analysis (an HR Analytics methodology), that employees who are more active in their social networks at work are more likely to stay at their current company. Furthermore, they also found that having more friends is more important than having just a few close friends when predicting turnover. Steiner (2017) shows how Nielsen, the market research company, through predictive analytics, was able to increase by 48% the chances of employees staying in the organization through career movements (a variable identified as one of the main predictors of attrition).

More successful applications of HR Analytics are presented in section 2.4.

1.5.4. Quidgest has organized a significant amount of workforce data for its clients, easing the procedure of implementing Human Resources Analytics

Aral et al. (2012) showed that there is a positive influence on organizational performance when Information Technology (i.e., HRIS) and Analytics are combined (Aral et al., 2012). Quidgest has already organized a considerable volume of HR Data for its customers. Therefore, it is possible to postulate that the HRAM will be an excellent addition to the current services' portfolio of the company and its clients. Having organized HR data is even more relevant since it is usually an identified obstacle for HR Analytics implementation (Fernandez & Gallardo-Gallardo, 2020; Isson & Harriott, 2016; Minbaeva, 2017).

1.5.5. The ability to visualize and analyze data in real-time

The HRAM will be implemented and integrated into Quidgest's HR Modules which is a great added value for several reasons.

First, users will be able to visualize data in real-time since the data source of the HRAM is the same as the one used for the current Modules in use by clients.

Second, it is known that HR professionals today lack the data manipulation and analysis skills needed to perform Analytics processes (Fernandez & Gallardo-Gallardo, 2020). Hence, having a system that organizes the data and provides critical insights through data visualization, reports, metrics monitoring, and other features is one of the great value propositions of the product.

The system providing real-time graphics, charts, dashboards[1], and analysis overall must be the key differentiator from other products in the market. It is probably both its greatest strength and the most significant threat. The investment made in the Module must justify the difference between having a system like this and not having to export data, treat the data, and put it in a spreadsheet (Excel) or other data visualization products present in the market (e.g., Power BI, Tableau, Qlik sense, among others).

1.5.6. Internal Use

Besides all the expected benefits of market share growth and increased revenue, positive externalities from developing an Analytics tool should also be considered, such as using the Analytics Module internally to improve Quidgest's Human Resources Management (HRM).

Additionally, Quidgest has other Business Areas that do not have consolidated Analytics services. This means the whole organization can acquire much know-how in technology, marketing, sales, and project management, among other areas, from this project.

1.6. Next Sections

These are some of the primary points in research and management literature that show that it is relevant for Quidgest to build an Analytics Module. The following section will outline what HR analytics is, why it is relevant, its primary business applications, and the challenges and limitations the HR function has faced in implementing it. The proposed framework to follow when planning and building the foundations of the HRAM, the System Development Life Cycle (SDLC), will also be presented.

[1] "*A data dashboard is a tool businesses use to help track, analyze, and display data, usually to gain deeper insight into the overall wellbeing of the organization, a department, or even a specific process. Behind the scenes, dashboards connect all kinds of different metrics, data sources, APIs, and services—and they help companies extract relevant information from those sources and display it in user-friendly ways.*" (Microsoft, 2021)

Chapter 2: Literature Review

2.1. Why Human Resources Analytics?

The use of analytics has spread over industries and shaped how managers measure their business, make decisions, and manage performance. Mcafee & Brynjolfsson (2012) found that companies who effectively use these processes perform better in objective measures of financial and operational results than their counterparts who do not implement Analytics.

As HR Data increases in volume, it is essential to transform that data into valuable knowledge to the organization to gain competitive advantage by balancing the insights gained from data analysis with managers' intuition, experience, and beliefs (Minbaeva, 2017). In a context where up to 70% of a company's cost is due to intangible assets, including Human Capital, it shows how urgent and necessary it is to use the best strategies available to make better decisions about the workforce (King, 2016).

So why is it relevant for management and HR Professionals to adopt HR Analytics processes, and why can it be a source of competitive advantage?

2.1.1. Human Resources Function as a Strategic Partner, through Human Resources Analytics

The discussion about the relevance of Strategic HRM is not new. Evidence shows that superior HR Practices influence employee behaviors, which positively impact strategy implementation, ultimately leading to higher operating and firm performance (Becker & Huselid, 1998). Moreover, companies' evolution and adoption of Information Technology are lightening the weight of the administrative work HR Professionals were traditionally in charge of. HR has now the opportunity to add value to the corporate strategy (Lawler, 2003; Ulrich & Dulebohn, 2015) and move from an overall generalist role to a more specialized one in the several areas of HRM Systems (e.g., recruitment, compensation, training, and others) (Ulrich et al., 2013).

To continue the process of bringing HR "closer to have a seat at the table," it is increasingly vital that HR professionals can use data to improve the decision-making processes regarding the workforce. As Lawler et al. (2004) have shown, "*Organizations with data that show the business impact of HR practices report they are much more likely to be a strategic partner than those organizations that do not have such data*" (p. 32). Furthermore, Kapoor and Kabra (2014) stated that "*HR Analytics can prove to be a major differentiator for businesses, one that can transform HR into a strategic partner*" (p. 1). Through Analytics, HR returns on investments can be quantified. With that, the HR Professional gets more involved in the strategic conversations of the company. They can be held accountable for their activities, like what already happens with other business areas of the company (Mondore et al., 2011).

2.1.2. **Focus on what matters – Better decision-making process**

Although there should not be a neglection of the role of the instinct, beliefs, experience, and intuition of HR professionals (Arellano et al., 2017), there should be a balance with evidence-based practices to help focus on what matters and "*allow the people agenda to run effectively and efficiently*" (van der Togt & Rasmussen, 2017, p. 128).

Based on the existent research and management literature, HR should adequately collect and analyze data to better understand the organization's context and improve decision-making processes. For instance, employee engagement is generally recognized as a driver for organizational performance, and organizations can measure it through employee surveys. The real challenge is measuring employee engagement and relating it with business outcomes in each organizational reality (Coco et al., 2011). Roberts (2013) shows a company's case study that measured employees' engagement and correlated it with Customer Satisfaction and Sales Growth. It identified that an increase of 2 percentual points on employee engagement would cost $200,000 US dollars. That increase would, in turn, generate $400,000 US Dollars in additional profits, making it a Return on Investment (ROI) of 100%. This is just an example of a company that took an evidence-based decision to invest in employee engagement, focusing on what really matters for them.

The use of HR Analytics can also be cost-efficient for companies. For instance, if we consider the example mentioned above on engagement analytics, the company could have spent $200,000 US Dollars in another HR area (or not invest at all). However, they knew that using that amount in improving engagement would generate profit. Alternatively, they could have had invested even more than the $200,000 US Dollars, with no relevant marginal effect on profit, which meant waste.

Another example of how HR Analytics can be cost-efficient is the case study presented by King (2016). A group of management consulting students found out, through HR Analytics, that the main reason for turnover at a company was the lack of rotation. It was estimated that, by applying successful measures to solve this challenge, the cost-savings it would generate (less recruitment and training costs and less knowledge lost) would be between $3.1 to $9.6 million US Dollars per year.

2.1.3. **Ownership**

Business Analytics (i.e., the application of Analytics methods to several areas of practice) is gaining relevance for Managers on how to run the business due to optimizing their decision-making process. It will be no surprise that Management will demand the same data-driven approach to run HR as it already does to other business areas (Seddon et al., 2017).

HR personnel must gain the skills and knowledge needed to fully implement HR Analytics practices. Otherwise, other areas will start doing it for them, like Finance or IT, who do not entirely

understand HR and the context of the data (Marler & Boudreau, 2017). Furthermore, the significant negative consequence would be for the HR function, *per se*, and for the organization and its employees as a whole, who would suffer in terms of development (Bassi, 2011).

2.2. What is Human Resources Analytics?

While there seems to be an increasing interest in mainstream management about HR Analytics, it does not seem that management researchers have focused a great deal of attention on the topic since there are still few well-known articles published (Marler & Boudreau, 2017). This might be one of the causes of why there are so many definitions for the same thing, such as "*HR Analytics,"* "*People Analytics*," "*Workforce Analytics*," *Employee Analytics*," "*Talent Analytics*," among others (Tursunbayeva et al., 2018), and at the same time, so many interpretations of what it is.

Lawler et al. (2004) define HR Analytics as the use of statistical techniques and experimental approaches, which help understand the impact of HR practices and policies on organizational performance. Bassi (2011) states that "*HR Analytics is an evidence-based approach for making better decisions on the people side of the business; it consists of an array of tools and technologies, ranging from simple reporting of HR metrics up to predictive modeling*" (p. 16). Mondore et al. (2011) define "*HR Analytics as demonstrating the direct impact of people data on important business outcomes*" (p. 21). Mishra et al. (2016) described HR Analytics as a "*multidisciplinary approach to integrate methodology for improving the quality of people-related decisions to improve individual and organizational performance*" and states that it "*plays a role in every aspect of the HR function, including recruiting, training and development, succession planning, retention, engagement, compensation, and benefits*" (p. 33).

To gather all these definitions, the systematization of research by Margherita (2021) highlights four main aspects of HR Analytics: "*a) it is an evidence-based approach to people-related decision-making; b) it adopts systematic methods of analysis and visualization of HR data; c) it serves the needs of executives and top decision-makers; d) it is a multi-process and multi-application endeavor with a broad spectrum of potential impacts*" (p. 2).

It is also important to distinguish "HR Analytics" of "HR Metrics," which are two terms that are often confused. People may consider Analytics to be just a set of different Metrics that were collected and overviewed. While this is an integral part of HR Analytics, it is not its whole (Bassi, 2011). As aforementioned, HR Analytics is about collecting, manipulating, and analyzing data so that the organization can make data-driven decisions about its people. HR Analytics is about applying different processes to analyze internal and external data to assess the current situation of the workforce and link HR Decisions to organizational outcomes and performance (Marler & Boudreau, 2017).

On the other hand, metrics are often related to efficiency, effectiveness, and impact measures that can help better understand and evaluate the impact of HR activities (Lawler et al., 2004). For illustration, an *HR Metric* would be, for example, how much time it is taking to fill a particular vacancy. An *Analytics Process* would analyze how the number of days to fill a particular open position has changed throughout a certain period and correlate it with other measures and activities of the recruitment process that may influence the metric of days to fill a job post. The visualization used to present the analysis, with dashboards, charts, and storytelling techniques, is also considered part of the Analytics process.

Although considering only HR metrics as "Analytics" is limited, considering that only "high-end" predictive and prescriptive processes as Analytics is limited as well (Bassi, 2011). The following section will lay out the different types and levels of HR Analytics contemplated in research and management literature.

2.3. Types of Human Resources Analytics

Within HR Analytics, there are three different types/levels of Analytics: *Descriptive, Predictive, and Prescriptive* (King, 2016; Margherita, 2021; Mohammed, 2019).

The first level, *Descriptive Analytics*, is the most employed by organizations, where data on past events is gathered and analyzed. It can be data on recruitment, internal movements (such as transfers or promotions), and absenteeism. It may use data visualization techniques, such as dashboards and reports. It aims to answer questions of *what happened, why it happened, and how it happened*.

The second level would be *Predictive Analytics*, whereby evaluating what happened in the past, it is possible to predict or hypothesize what will happen in the future. This level aims to answer questions on *what will happen and why it will happen*. Examples of predictive analytics may be calculating the probability of candidates accepting a job offer or predicting the turnover rate. This level already involves some degree of statistical techniques, data mining, and advanced algorithms.

The third and last level is *Prescriptive Analytics*, which companies rarely employ. It may involve using linear programming, simulations, mathematical modeling to design solutions to fix current organizational issues. It can answer a question like "*considering what will happen, what should we do?.*"

2.4. Human Resources Analytics Applications

So far, we have covered how HR Analytics is defined in the literature and why it is relevant for HR departments to adopt these processes. It is also essential to understand the practical application of HR Analytics and how organizations are using it to improve organizational performance. It has a wide range of applications, and it is involved in all talent life cycles. From Workforce Planning, Recruitment

and Selection, optimally allocate candidates to functions, onboarding, predict turnover, performance appraisal, training, engagement, amongst others (Chalutz Ben-Gal, 2019; Ekka, 2021; Isson & Harriott, 2016; Khan & Tang, 2016; King, 2016). From sections 2.4.1 to 2.4.5, some of the essential applications of HR Analytics will be outlined.

2.4.1. Workforce planning

Isson & Harriott (2016) defined workforce planning as "*the process that enables organizations to identify what talent they will need to achieve their business goals and objectives, from current needs to future demand and succession planning*" (p. 101). Anderson (2004) summed up workforce planning in 4 main steps: 1) *Supply Analysis*, where organizations should assess their workforce in terms of demographics, competencies and analyze how the overall job market looks like in those matters; 2) *Demand Analysis*, which should describe what the organization will need in the future, in terms of the number of employees and competencies needed; 3) after, *analyze the gap* between supply and demand; 4) and based on that, define measures that should be taken.

Data is characterized as "*the foundation of analytics and represents the backbone of workforce planning analytics*" (Isson & Harriott, 2016, p. 109). Data on talent, the market (information about the competition), business (KPIs of the organization), economics and industry data, labor statistics, and university graduation data are critical for successful workforce planning. Essentially, workforce planning is an effort that demands the attention of several company areas (marketing, sales, finance, HR). Hence, there is the need for "*internal data (e.g., from the ERP, headcount, product mapping, financials, budget) and external data (e.g., surveys, salary tables, syllabuses, and training program materials)*" (Chalutz Ben-Gal, 2019, p. 1440).

2.4.2. Recruitment and Selection

It is well established that the capacity to attract the best talent, both in quality and in quantity, can be a significant source of competitive advantage for organizations (Pfeffer, 1995, 1998). A study performed by the consulting firm Boston Consulting Group defined Recruitment as the most impactful HR function on profit growth, profit margin, and performance improvement (Sullivan, 2012). So, it is not strange that companies and researchers are trying to develop HR Analytics processes to optimize the hiring process.

Isson & Harriott (2016) state that Analytics can be used in the stages of candidates' application, preselection, interviews, and selection of the candidates. It plays a role in defining the process itself and answering questions like "How many questions to have in an interview?", "How relevant is it to assess the candidate's resume?" or "What type of questions should interviewers ask?". Furthermore, HR Analytics processes may correlate Interview Performance and Job Performance, Academic

background versus Job Performance, who is a great cultural fit, who will be a top performer, who will stay longer, among other variables.

In more practical terms, Escolar-Jimenez et al. (2018) proposed the use of an algorithm to shortlist candidates based on their educational background, years of experience, competencies, among other factors to help HR departments "*systematically and objectively sort and shortlist a large number of job applicants, (…) and reduce the time and resources needed in the selection process*" (p. 1).

2.4.3. **Engagement**

The British-Dutch multinational oil and gas company, Shell, started looking at how engagement drives individual and company performance. They found that engagement was mainly influenced by the organizational and teams' leadership. Those insights allowed them to start a set of interventions on their leadership lines, such as Annual Feedbacks to line managers on how well they engage their employees. Also, interventions were made to improve the personal safety of the employees those line managers supervise (van der Togt & Rasmussen, 2017).

Tomlinson (2010), Head of HR at KIA Motors, took over the HR department in 2006, when the company was facing increased financial losses, low levels of employee engagement, and consequently, a 31 percent employee turnover rate. One of the first steps taken was to measure employee engagement and its drivers. KIA identified the following primary drivers of engagement: "*Senior Leadership*," "*Understanding & belief in company direction*," "*Direct line manager*," "*Involvement/consultation on company decisions*," "*understanding of key business issues*," and "*training and development*." After, a "*five-pronged strategy*" was implemented to improve leadership development, employee recognition, internal communication, organizational development, and employee development. Through Analytics, KIA was able to identify their leading causes for low employee engagement and take the proper actions to tackle them. It resulted in an average increase of direct line manager performance, improved employee engagement, and reduced turnover from 32 percent in 2006 to 2 percent in 2009.

2.4.4. **Performance Management/Appraisal**

The task of adequately measuring job performance, correlating it with the different variables that surround it (employee's attitudes, cultural influences, work situation, job satisfaction, and others), and being capable of predicting performance, has proven to be a difficult one (Saari & Judge, 2004). Moreover, since we are moving to a knowledge-based economy, this task is turning out to be more difficult since more variables have to be considered in the equation than in the past (Luo et al., 2019; Nicolaescu et al., 2020).

Still, advancements are being made. For instance, researchers have developed models based on artificial intelligence to reduce bias and subjective judgments that happen in a performance appraisal process. By "feeding" these models with past employees' data related to teamwork, attendance, goal achievement, leadership behaviors, task completion, hard and soft skills, and attributing an overall grade on past performance, it is then possible to predict future performance with greater accuracy (Escolar-Jimenez et al., 2019; Luo et al., 2019; Nicolaescu et al., 2020).

2.4.5. **Turnover**

Due to its overall negative effect on organizational performance, separation, and replacement costs, researchers, scholars, and managers are using several analytics methods to study and predict voluntary turnover (Allen et al., 2010; Mukhopadhyay et al., 2020).

Rombaut and Guerry (2018) applied a logistic regression in a Belgian company to know the probability of voluntary turnover of each employee. The researchers only used the available HR database of a company and did not use any complementary methods, such as company surveys. They were able to identify the major variables influencing turnover such as gender, age, salary, having or not a company car, amongst others. This study enabled the company's HR Managers to identify the "high-risk leavers" and take proper actions to mitigate that risk. In this case study, the authors defined a threshold of 30%, meaning, if an employee has the probability of leaving higher than 30%, measures should be taken.

Schlechter et al. (2016) also developed a case study using a logistic regression in a South-African company that helped identify the statistically significant variables with predictive value. Again, this study was developed to target the HR initiatives better and take measures to prevent turnover.

Social Network Analysis is also used to identify the key players of an organization in terms of centrality in work, friendship, and advice networks. Depending on the "positions" employees take in those networks, it is possible to identify those who have a higher risk of leaving due to isolation or collaborative overload from too many connections (Thomas H. Feeley & Barnett, 1997; Thomas Hugh Feeley et al., 2008; Mitchell et al., 2001).

2.5. **Human Resources Analytics' Challenges and Limitations**

Fernandez and Gallardo-Gallardo (2020) performed a comprehensive literature review on HR Analytics, with 64 manuscripts from 2010 to 2019. They identified and summarized 14 barriers and obstacles of HR Analytics implementation and grouped them into four main categories:

1) *Data and Models*, due to the poor data management, insufficient metrics, lack of data sharing within the organization, and overall low quality of the HR Data;

2) *Software and Technology*, since "*the software for carrying out predictive and prescriptive HR Analytics is design by and targeted to people with analytical skills, rather than on HR professionals*" (p. 21);

3) *People*. The lack of skills, knowledge, and competencies of HR professionals related to Analytics is well identified, but also, the sense of a more strategic view on the use of Analytics is a bottleneck as well;

4) *Management*, not only in terms of managerial buy-in regarding the adoption of HR Analytics, but also in the management *per se,* meaning, who should take the lead in HR Analytics, and who is the final responsible for these processes. HR? IT? Finance?

Moreover, the authors suggest "*14 key factors that will help organizations overcome the (…) barriers to HR Analytics adoption*" (p. 27), which will be presented in the subsequent section.

2.6. Moderators to succeed at Human Resources Analytics

Fernandez & Gallardo-Gallardo (2020) suggest 14 primary practices, grouped in 4 main categories, to overcome the barriers mentioned in the previous section: 1) "*Preparation*," which includes the definition of business problems to solve with analytics, data preparation and management, and cooperation between functional areas; 2) "*development*," which encompasses the proper definition of HR Metrics, and "*development of statistical and optimization models and specific software that allow predictive and prescriptions analysis*" (p. 30); 3) "*Dissemination*," as to how results are spread and shown to management. It is also vital to assure credibility and trust in the results presented and used in the decision-making process; 4) and "*Team*," by developing the necessary skills (analytical, business, storytelling), and adequately defining the "*location of the team*" (if inside the HR department, outside of it, or create a new one).

Green (2017) summarizes the requirements to excel at HR analytics in seven competencies: data management, storytelling, business acumen, data visualization, psychology, statistics, and change management (Appendix G, Figure 12). Without one, HR will probably miss out on the potential of Analytics. For example, without psychology skills, analysts will miss out on possible bias and misinterpret results. Without storytelling, the output will not be effectively communicated to the rest of the organization. Furthermore, without change management skills, all the insights gained will not turn into actual outcomes or measures to solve organizational challenges. As Green conveys, it is complex to implement HR Analytics processes due to the different skill sets (or background) needed.

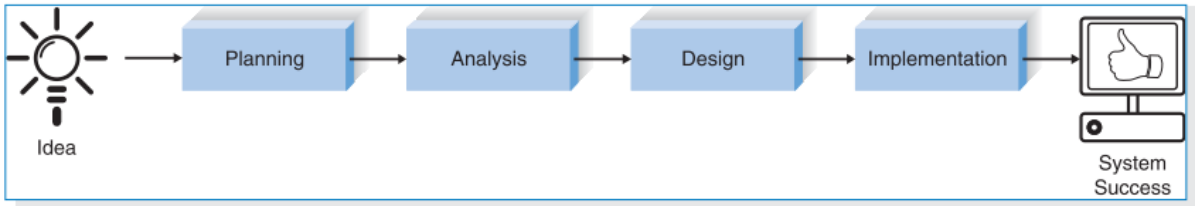
Finally, aside from the skills, knowledge, information technology, and managerial buy-in necessary to be successful at HR Analytics, researchers see collaboration between several functional areas to take on this endeavor as necessary (Boudreau, 2012). Not only because other functional areas are

more advanced in terms of Analytics implementation and can contribute to a better adoption process, but because it can also promote engagement of key decision-makers (Marler & Boudreau, 2017).

2.7. System Development Life Cycle

The SDLC (Dennis et al., 2012) is the framework that guided this initial phase of development of the HRAM. As displayed in Figure 2, the cycle is triggered by an idea of building a new system until the system's success. It is composed of 4 main stages: *Planning, Analysis, Design, and Implementation.*

Figure 2. *Systems Development Life Cycle*



Note. From *Systems Analysis & Design* (5th Editio, p. 11)., by Dennis, A., Wixom, B. H., & Roth, R. M.,2012, John Wiley & Sons, Inc.

The *Planning* phase focuses on answering why the system should be built, how the project will be structured. The primary outputs of this phase are to deliver a system request with a feasibility study and a project plan. The *Analysis* phase defines who will use the system, what it will do, and when and where it will be used. This phase aims to specify requirements, develop a business analysis model. Its main output is a system proposal to be presented to the project sponsor and key decision-makers to decide if the project should move forward or not. After most strategic decisions have been made in the analysis and planning phases, the *Design* phase "*decides how the system will operate in terms of hardware, software, and network infrastructure*" (Dennis et al., 2012, p. 14). Its main deliverables are the system's architecture design, interface design, and database and file specifications, i.e., the *programming team's system specification* to implement the project. The last phase of the SDLC is the *Implementation* phase, where the system built is installed, and a training and support plan is created to teach the users how to use the new system.

As proposed in the introduction of this work, the project's purpose is to develop the deliverables up until the analysis phase, i.e., the system proposal. Then, Quidgest already has most of the foundations for the programming team to start developing the HRAM.

2.8. Requirements

A requirement is "*a statement of what the system must do or what characteristics it needs to have*" (Dennis et al., 2012, p. 104). The set of requirements defines the purpose of the system, why it is relevant, which expectations users have towards the system to be developed, how it should be built, and ultimately what it should do. This list is then "*supported, confirmed, and clarified by the other*

activities of the analysis phase: creating use cases, building process models, and building a data model" (Dennis et al., 2012, p. 104).

The types of requirements that define the system, according to Dennis et al. (2012), are the following:

- **Business Requirement**: what the business needs are. They help define the overall goals of the system and help clarify the contributions it will make to the organization's success
- **User Requirement**: what the users need to do. These user requirements describe tasks that the users perform as an integral part of the business' operations.
- **Functional Requirement**: What the software should do. They define the product capabilities or things that a product must do for its users. Functional requirements begin to define how the system will support the user in completing a task.
- **Nonfunctional Requirement**: Characteristics the system should have. This group of requirements defines the quality attributes, design, implementation constraints, and external interfaces a product must-have.
- **System Requirement**: How the system should be built. These requirements focus on describing how to create the software product that will be produced from the project.

2.9. Literature Review Conclusions, and Next Sections

The previous sections presented what HR analytics is, why it is relevant, the main applications throughout the employee life cycle, the moderators to succeed in it, and the main challenges and barriers HR professionals have faced in its implementation.

When correctly implemented, HR Analytics is a source of competitive advantage. With businesses turning to data to improve efficiency and effectiveness in several business areas, it is only natural that Management will require the same thing from HR. However, due to the lack of skills and technology available, HR is lagging in the Analytics revolution.

That is why it is relevant to build an HRAM. It is a low supply product and helps HR Professionals who lack the Analytics skills needed to implement HR Analytics processes.

To structure the development process of this project, research on SDLC was presented, as well as the description of different types of requirements that will define the system.

Considering the gap between the relevance of HR Analytics and its low adoption levels, it is considered that developing this project is relevant to answer HR Professionals' needs. The structure, methodologies, and findings of this project are presented in the following chapter.

Chapter 3: Method

3.1. Project Design

This project will be based on an inductive approach, where there is a more flexible structure of research, there is less concern with the need to generalize results, and there are no preconceived ideas, unlike deductive reasoning, which is based on testing hypotheses, have a highly structured approach, and aims to explain causal relationships between variables (Saunders et al., 2009).

A mixed-methods approach was used throughout the development of this project (Amaratunga et al., 2002; Saunders et al., 2009). It has components of qualitative research since there were few preconceived ideas on what the HRAM will be. There is more than one data collection method. Those methods will be unstructured or semi-structured to collect data (a JAD Session and semi-structured interviews). On the other hand, elements of quantitative research are also present. The questionnaire is a structured method of collecting data, and its results were analyzed through descriptive statistics methods. Moreover, the interviews were divided into categories to be "unitized" and analyzed through statistical procedures (Gerhardt & Silveira, 2009).

The main reason to adopt this approach is to triangulate the research's findings from multiple data sources and complement the several methods used by counterbalancing their strengths and weaknesses (Saunders et al., 2009).

3.2. Data Collection Methods and Analysis

The data collection methods used in this project are considered requirements elicitation techniques, meaning, "*a variety of techniques*" will be used to "*make sure that (…) the needs for the new system are well understood before moving into design*" (Dennis et al., 2012, p. 111). The methods/techniques proposed by Dennis et al. (2012) and adopted in this project are interviews, a questionnaire, and two JAD Sessions.

3.2.1. Interviews

The main goal of running interviews was to understand if HR professionals find relevance in having a Module like this and why. Through that, we will be able to build a better value proposition for the system. Furthermore, interviews identified the main characteristics users would like to have and which HR practices they would analyze the most. To meet these goals, the *Interview Guideline* (in *Appendix A, "Interview Guideline"*) was divided into four main topics: *Experience with HR Analytics, Main Challenges and Barriers that HR Professionals* face with Analytics, *main characteristics and features* the interviewee would look for in an HRAM, and *which HR Practices would he/she analyze the most.*

The type of interviews used was semi-structured. There was a list of themes and questions to go over in each interview. However, the order of the questions and the follow-up questions varied,

considering the flow of the conversation (Gerhardt & Silveira, 2009; Saunders et al., 2009). Interviews are considered to be very well-suited in projects of exploratory and qualitative nature due to their flexibility and capability of producing data in greater depth than other methods (Amaratunga et al., 2002).

3.2.1.1. **Interviews' Sample**

The interviews' sample is nonrandom since the interviewees of the target population were chosen based on specific practical criteria, such as availability at a given time and willingness to participate. Moreover, nonrandom samples are also used when there is no significant concern in drawing inferences from the sample to the population (Etikan et al., 2017). The target population was HR professionals with diverse experience in HR. Furthermore, since top management commitment and support is one of the most critical success factors in developing and implementing an Information System (Purna Sudhakar, 2012; Wong & Tein, 2003), the Manager of Quidgest's HR Business Area was interviewed.

The interview's sample comprises eight professionals, seven with HR experience (from two up to ten years of experience). The one professional without direct HR experience is an employee of a Quidgest client, responsible for implementing Quidgest's ERP organization-wide. Only *Interviewee H* has experience with HR Analytics. The interview sample is in Appendix A, Table A.2: Interviews' Sample.

3.2.1.2. **Interviews' Analysis**

All interviews were recorded and transcribed based on the Informed Consent signed by all the participants (the model is in *Appendix A*, "*Form of informed* consent"). The transcribed interviews will not be fully presented in this work to preserve the confidentiality agreed with the interviewees. Nonetheless, excerpts of the interviews are conveyed in *Appendix A*, "Table A.4: Interviews' Excerpts". The transcriptions were uploaded to a Computer Assisted Qualitative Data Analysis Software (CAQDAS), MAXQDA, appropriate for developing qualitative analysis focused on understanding the meaning of texts and actions (Kuckartz & Rädiker, 2019). Each interview was carefully analyzed, and to make some sense of the information collected, several categories and sub-categories (or codes) were created related to the objectives of the interviews. The goal was to attribute categories to paragraphs and analyze which patterns and relationships could be derived. Also, it was a method of "unitizing" qualitative data and making it easier to analyze (Saunders et al., 2009). The categories created for analysis were: *CB: Challenges and Barriers with HR Analytics*; *PA: HR practices/topics currently under analyzes or that the interviewees feel would be analyzed the most with an HRAM*; *R: Requirements*.

The structure of categories and sub-categories is presented in Appendix A, Table A.1: Interview Categories.

3.2.1.3. **Interviews Results**

As mentioned above, the analysis of the interviews was organized into three primary categories. The analysis was "unitized" regarding the number of interviewees (out of the eight professionals interviewed) referred to a specific category. The overall results of the interviews' analysis are presented in Appendix A, Table A.3: Interview Results, and all excerpts are presented in Table A.4: Interviews' Excerpts. Some of the most relevant testimonials are outlined in this section.

Concerning Challenges and Barriers in implementing HR Analytics processes, 87,5% (7) of the interviewees identified the Knowledge, Skills, and Competencies in HR Analytics of HR professionals as one of the main challenges. Furthermore, 87,5% also identified the *lack of appropriate technology and software available* to support HR Analytics processes as another challenge. 50% (4) of the interviewees mentioned the *lack of structured and organized HR data*, 37,5% (3) identified *Management support and interest* in HR Analytics, and 12,5% (1) stated that the *Lack of Time* was also a factor to consider when trying to implement Analytics in HR.

These findings align with what the literature states as the main challenges and barriers in HR Analytics implementation.

"*Within the team, we only have one person who understands excel more deeply, and if that person is not there, we have no way to do the metrics, for example.*"

- Interviewee A, on the lack of Analytics skills

"*They* (Management) *do not want to invest, (…) they do not think it is necessary. They think that if it has always been a certain way, and if it has always worked, why should they change?*" and "*During the five years that I was involved in an HR department, I felt much lack of training in this area.*"

- Interviewee B, on the lack of management support and training in HR Analytics

"*(…) I think you have very good systems for very good companies with much money. And then you have 'lost excel sheets' for what are medium-sized companies with absolutely terrible data. (…) It is strange how there is not even a basic tidying up of the data. There is a huge lack of knowledge, a lot of disorganization, planning, and no* ad hoc *management.*"

- Interviewee H, HR Analytics consultant, about the lack of HR data management

The interviews were also useful to understand how the system can add value and be relevant to HR Professionals and Organizations. 75% (6) of the interviewees identified the *ease of analysis* that this system can offer as one of its main strengths, i.e., having a platform that saves time and reduces costs in treating the data to be analyzed. In line with those above, 62,5% (5) mentioned that having a fully integrated system managing the diverse HR data and not being forced to move between different

platforms to analyze the data is also a great added value. 37,5% (3) referred that they would like to have predictive components, such as the possibility to perform Regression Analysis. 25% (2) of the interviewees also mentioned that the HRAM could catalyze the HR Professional to have a more strategic role in the organization. Other vital points mentioned were the ability to measure the ROI of HR, share content on-demand, and have real-time data analyzed quickly (at least one interviewee referred to each topic aforementioned).

"*This thing of having to take the data from one side, then work on it, and then do the ETL part manually... we want to do it without that process, and have this integrated into one place* (…) *and forego this middle part, which is the most boring and least interesting, and most labor-intensive. If we can have software tools that do that for us, that is what we want.*"

- Interviewee G, about the ease of analysis and full system integration

"*Because Management and Middle-Management only care about numbers. (…) (we) cannot translate what we do into numbers. That is why we are very as support, and we do not fight with the same language* (as other business areas)."

- Interviewee C, referring to Analytics as a way for HR to have a more strategic role in the organization

"*In terms of time availability of the data, I would not make a point of having the data in real-time. (…) you* (do not) *need to know more recent data, like attendance or payroll. There are timings in which this happens. Maybe I am not interested in seeing attendance in the middle of the month. I am only interested in seeing it at the end of the month. So, I do not need to have it by the day.*"

- Interviewee G, about the benefits of controlling when data is updated in the Analytics Module and not emphasizing real-time data for everything

"*But we should be able to have real-time info, up-to-date, and not have to wait for items or features to be generated or exported that are not done on time.*"

- Interviewee D, offering a different view as to what was mentioned by Interviewee G above on the importance of having real-time data.

"*(organizations) are tied to one system (…). If it was not for a monetary issue, they would have many more tools (…). The tendency is more and more to atomize the tools, that is, to choose the proper that we want and then integrate them all. But yes, many companies are held hostage by one system*".

- Interviewee F, stating that the trend is for companies to have different tools for different objectives, and vendors should be able to integrate them. It is a counter view, as other interviewees mentioned, where full integration (having the same system) was beneficial.

Throughout the interviews, it was possible to identify the primary HR Practices and Topics that the interviewees were already improving through HR Analytics. It was also assessed if they had an HRAM to help them in those processes and which practices/topics they would prioritize. The ones highlighted were Payroll/Compensation and Benefits (75% of the interviewees), Training, Turnover, Recruitment, and Performance Appraisal (each one was identified by 62,5% of the interviewees), Onboarding, Attendance, and Demographics (each one was identified by 37,5% of the interviewees), and Workforce Planning, Diversity and Inclusion, Engagement, and Demographics (each one was identified by 12,5% of the interviewees).

"*From my experience, what I see is that perhaps the data that is most labor-intensive and requires the most care is Payroll Data and all its variants. A platform that was good in this sense would be excellent.*"

- Interviewee A, stating that Payroll is the practice to be analyzed

"*Also understand concrete data and numbers related to work attendance and absences. We had a lot of employees constantly putting in - 20 to 30-year-olds - constantly putting in sick leave.*"

- Interviewee B, stating attendance as one of the practices to be analyzed

"*(…) compensation, and compensation next to performance.*"

- Interviewee F, referring to compensation and correlating it with performance

"*(…) traditional HR metrics, Headcount, salaries, Education, age, gender, geography, job name, team, functional group (very important), costs, the average and total sum of costs, percentage weight of costs, percentage weight of salaries against revenue, admissions, turnover by date, cumulative turnover, in percentage, seniority, then an organization tree. People costs based on revenue, something important.*"

- Interviewee H, referring to demographics, payroll, recruitment, turnover, and analyzing those against the costs the organization has

It was also possible to assess the main tasks the interviewees believe the users would like to fulfill using an HRAM. Throughout the interviews, the main User Requirements identified were "Customize Dashboards" (50%), "Customize Charts" (50%), and "Customize Reports" (37,5%).

"*(…) dashboards that are easy to build and be able to track metrics and KPIs. (…) the option for customizing Reports, which I think they have particular needs of the business, and it is important to have more than the standard reports that they have, (…).*"

- Interviewee D, identifying dashboards that are easy to build, the ability to track metrics and KPIs, and customizing reports as the main characteristics the interviewee would like to have

"*Quite frankly, if we have access to export detail data and have charts and dashboards, which is the 'bread and butter,' but that is what we urgently need, it will save us so much workload.*"

- Interviewee G (Quidgest client) stated the urgency of having charts and dashboards. Those would be the "bread and butter" (the basics)

"*(…) allow deeper analysis than averages or standard deviations. (…) Things like correlations and seeing whether or not hypotheses have a statistical difference is important.*"

- Interviewee F, mentioning more advanced methods and tools in the system

"(…) if Quidgest wants to focus only on descriptive statistics and working on the data and metrics, I think you should focus more as a competitive advantage on visualization. That is what people want. We have a very lazy eye. (…) What differentiates good and bad (HRIS) *is how the data is explained and visualized (…) and then take the next step to predictive models and optimization.*"

- Interviewee H, underscoring the importance of data visualization

Interviews were also a source to gather nonfunctional requirements. Four main sub-categories categories were identified throughout the analysis. 75% of the interviewees stated that the system should be *fast and efficient*. Although it is a broad and subjective definition, it is essential to note that users value it. 50% referred to *Data Security*, and 50% mentioned how the system should *comply with GDPR*. Lastly, 25% indicated that there should be the possibility to define access roles and permissions to the system (*Access Management*).

"*To understand if there is no information leakage. GDPR compliance. All these confidentiality issues.*"

- Interviewee B, indicating the main concerns would be about data security ("information leakage"), GDPR, and confidentiality

"*I think the security part is essential. (…) It is also important in a relatively recent aspect, a concern of HR, which has to do with the GDPR* (…)."

- Interviewee B, referring to data security and GDPR

"*(…) it would be important to have profiles of what data each person has access to. Because we can have people from HR who will have access to certain data, and people from the Planning Division who will have access to that data and other data, and we have the Director who will only want the dashboards to be able to do monitoring over time.*"

"*Having this, something that works, and in the terms that we are asking for, that is efficient, that is fast, or even if it is a little bit slow, it would already be more flexible and available than what we currently have, and save us some ETL work, is what we would want.*"

Interviewee G, on access management, and speed and efficiency, respectively.

3.2.2. **Questionnaire**

Questionnaires are an excellent method of gathering potential direct and indirect users' opinions, feelings, thoughts, suggestions, and priorities (Dennis et al., 2012). Therefore, a questionnaire was also distributed to complement the results gathered in the interviews and reach a vast and diverse audience. The questionnaire was shared through social media (LinkedIn), via feed posts, and directly messaging people whose roles indicated they were HR Professionals or CEOs. Additionally, the questionnaire was also shared by e-mail through Quidgest clients' mailing list.

The English and Portuguese versions of the questionnaire are presented in Appendix B and Appendix C, respectively. The questionnaire consists of 17 multiple-choice questions and five open-ended questions, divided into three main sections, focused on gathering information to support the requirements for the HR Analytics Module and not at confirming predefined hypotheses.

The first section consists of *Demographical questions*. It seeks to gather information on the individual profile of the responders in terms of their role in their organization, years of experience in HR, and data about their organization (size, business volume, and public or private sector). This is relevant to make sure that the questionnaire is gathering information from potential users of the HRAM.

The second section is composed of 3 open-ended questions to *identify the critical features the responders (i.e., potential users) value the most in an HRAM*. The open-ended questions are used to capture better the suggestions, thoughts, and opinions of the responder and *do not limit them with standard multiple-choice answers*. This section also asks responders *which methods they value the most in a system like this*. The choices given to the responder in terms of methods are retrieved from Van Hulpen (2019), which presents a set of examples of HR Analytics methods. Moreover, the last question of this section seeks to know which *HR practices* (e.g., Recruitment, Turnover, Engagement, and so forth) responders value the most to undergo an Analytics process. The options available are the HR practices measured through HR Analytics and presented by Tursunbayeva et al. (2018) in their scoping review of *People Analytics.*

The third section asked *which type of HR data organizations already collect about their workforce* and which HR practices they focus on the most (e.g., recruitment, compensation and benefits, Training). These inputs are relevant so that when planning which features to include in the HRAM, we

focus on the most relevant HR practices. The options available on the question regarding the type of HR data collected and analyzed will be based on the work of Chalutz Ben-Gal (2019), Ekka (2021), Isson & Harriott (2016), Khan & Tang (2016), and King (2016). The two last questions of the questionnaire are *focused on understanding which obstacles/barriers users consider being the most difficult to overcome when implementing HR Analytics*. The options available were retrieved from the research of Fernandez & Gallardo-Gallardo (2020), which identified the key challenges and barriers to HR Analytics implementation in organizations.

3.2.2.1. **Questionnaire Sample**

The sample characterization data tables are conveyed in Appendix D. The questionnaire was answered by 119 people, of which 86 were female (72,27%), and 33 were male (27,73%) (Table D.3). About 93,28% of the respondents have HR-related roles, and CEOs and C-Level Executives account for 6,72% of the sample (Table D.1).

Of the whole sample, 35 respondents (29,41%) affirmed to have more than ten years of experience in HR, 29 (24,37%) five to ten years, 25 (21,01%) one to two years, 22 (18,49%) three to five years, 6 (5,04%) have less than one year of experience. Two respondents stated they do not have any direct experience working with HR (Table D.2).

Regarding Education Level and Academic Background (Table D.5 and D.6, respectively), almost half of the sample (46%) has a Master's Degree, 24% have a Post-Graduation, 29% have a Bachelor's Degree, and one respondent has a High School Diploma. Regarding the Academic Background, about 42,02% are from Human Resources Management, 16,81% from Organizational Psychology, 8,4% from Business Management, 7,56% from Psychology, and 3,36% from Sociology.

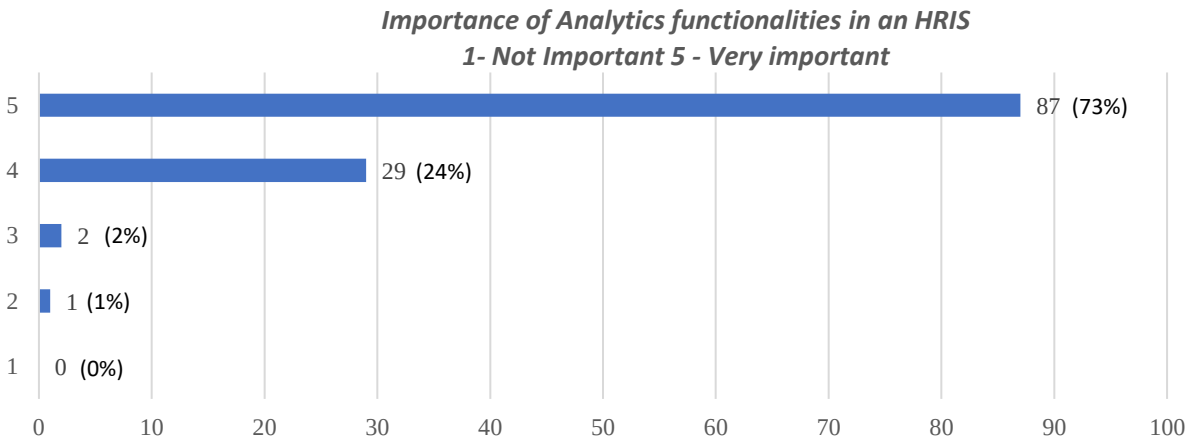
In terms of the size of organizations (Table D.7), about 64% of the responders are part of an organization that employs more than 250 employees, 23% from 51 to 250 employees, 10% from 11 to 50 employees, and 3% up to 10 employees. When it comes to business volume (Table D.8), 45% state that it is above 50 million euros, 22% from 10 to 50 million euros, 18% from 2 to 10 million euros, and 14% less than 2 million euros. Most of the responders work for the private sector (Table D.10) (106 responders out of 119), and 4 stated they were Quidgest clients (Table D.9).

3.2.2.2. **Questionnaire Results**

The research approach of this project, as mentioned before, is one of qualitative and explorative nature. Hence, the questionnaire was built to gather insights about the HRAM without any preconceived ideas. This results in a more descriptive analysis of the questionnaire results since it is not sought to validate hypotheses or make inferences from this sample to the population. The questionnaire results' data tables are conveyed in Appendix E.

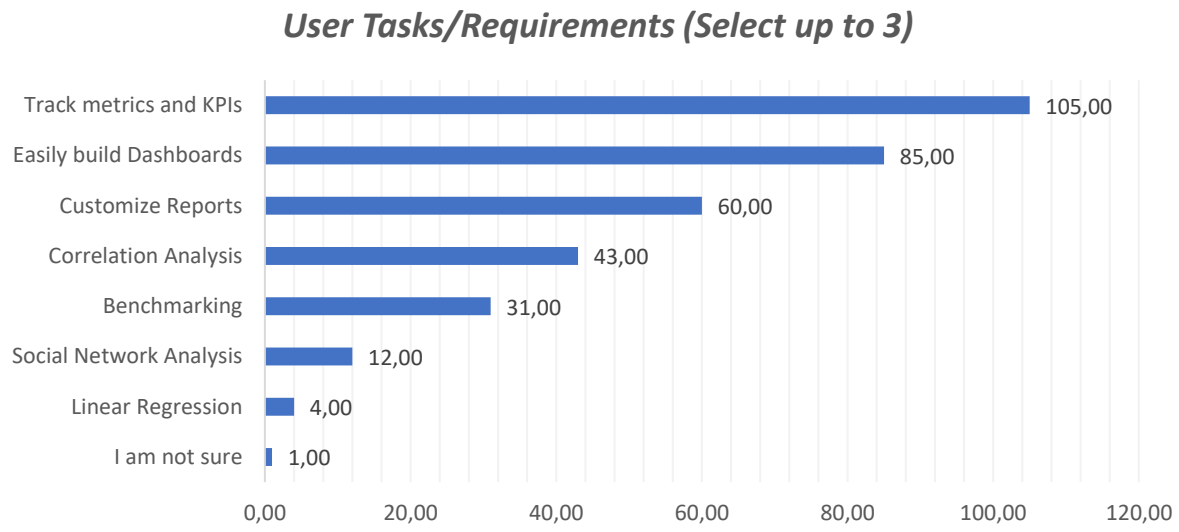
One of the crucial results of the questionnaire was understanding the importance of Analytics functionalities in an HRIS. 73% of the responders considered it “Very important,” and 24% considered it “Important” (Figure 3). On a scale from 1 to 5, the Global Average was 4,69 (Table E.2).

Figure 3. *Questionnaire results to the question "When acquiring an HR Information System, how important is it for you to have an Analytics function, such as the ability to visualize dashboards, calculate metrics, reporting services, among others?"*



When asked about the top 3 functionalities responders would look for in an HRAM, 88% stated the ability to “track metrics and KPIs,” 71% chose “Easily build dashboards,” and 50% stated “Customize reports” (Figure 4).

Figure 4. *Questionnaire results to the multiple-choice question "Which HR Analytics methods do you believe you would use the most or value the most when acquiring an HR Information System? (Select Up to 3) - Van Hulpen, 2019"*



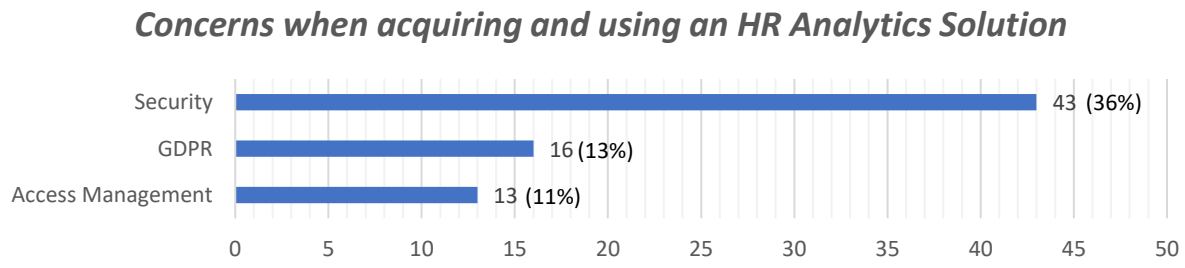
The questionnaire also had an open-ended question to gather user and functional requirements: “*What are the main features of the systems you would value the most in an HR Analytics Solution? Please, identify to the utmost three critical features*”. Answers focused mainly on the ease of data analysis that a system like this may offer (49% of the responders cited something related to that area). However, it was not easy to find more objective requirements through this question. Nonetheless, 15%

of the interviewees mentioned dashboards, 15% the ability to customize reports, 8% pointed out tracking Metrics, and 8% mentioned monitoring and managing KPIs (in Appendix E, Table E.3).

Regarding the practices responders analyze the most, the most chosen ones were Performance Appraisal (38%), Turnover (34%), Learning & Development (32%), Engagement (32%), and Compensation and Benefits (31%) (in Appendix E, Table E.5).

When posed with the open-ended question "*What would be your main concerns as a User/Manager/Administrator of an HR Analytics Solution? (in terms of Performance, Security, Capacity, and Reliability)?*", 36% of responders stated Security, 13% GDPR, and 11% Access Management (Figure 5).

***Figure 5**. Questionnaire results to the multiple-choice question "What would be your main concerns as a User/Manager/Administrator of an HR Analytics Solution? (in terms of Performance, Security, Capacity, and Reliability)?"*



The questionnaire also served to identify the main obstacles that HR professionals face when implementing HR Analytics processes (in Appendix E, Table E.6). 34% of the responders identified "Suitable software and technology available to perform HR Analytics" (the most voted item), which may indicate that the current technology available is not fulfilling the needs of HR professionals in this area. 28% stated that it was due to "insufficient skills, knowledge, and competencies of HR professionals related with Analytics," which is a good indicator for the development of this project since it aims to build a new tool to ease the analysis of HR data. 22% indicated that it was due to "Management buy-in and interest in HR Analytics," and 17% pointed to the "lack of HR Data Management."

3.2.3. **Joint Application Development**

Joint Application Development (JAD) is a session, or multiple sessions, where project managers, users, analysts, software engineers, among others, meet to identify business needs and system functional and nonfunctional requirements of the system to be developed, under the guidance of a facilitator. The session(s) are supposed to have a structured agenda, designated scribes to document the output of the meetings, and group dynamics are implemented, such as brainstorming, to spark creativity (Asaro, 2000; Dennis et al., 2012; Duggan & Thachenkary, 2004; Jackson & Embley, 1996).

The main goal for the JAD Sessions developed in this project's scope was to have a clear and prioritized output of what functionalities we want to have in the HRAM. There were two JAD Sessions developed at Quidgest, which I facilitated. The first JAD Session followed this logical sequence of topics: 1. Alignment; 2. Current State; 3. Our Competition; 4. User Questionnaires; 5. Start Envisioning; 6. Requirements Consolidation, and its content will be presented from section 3.2.3.2 to 3.2.3.8. A second and final JAD session was held to consolidate the inputs received from the project's multiple sources. The last session content is presented in section 3.2.3.9, and the results are presented in section 3.2.4.

Some of the PowerPoint slides used to guide the JAD session are presented in Appendix G.

3.2.3.1. **Joint Development Application Workgroup**

The first and second Joint Application Development sessions were developed at Quidgest's premises, with me as a facilitator and a team of six Quidgest employees. It was a multi-disciplinary workgroup, as it was composed of the Manager of the HR Business Area, three HR Business Analysts, one coordinator of the programming team, and the HR Representative of Quidgest. The Manager and the Business Analysts contributed to the session through their great understanding and knowledge of Quidgest's HR systems and HR general knowledge. The programming team coordinator contributed to the session with its technical insights, knowledge of how the system is programmed, and assessment of what can and cannot be developed given our current technological capabilities. The HR representative gave us insights into what kind of tasks users may want to fulfill and which challenges and barriers we need to help them overcome in terms of HR Analytics implementation.

3.2.3.2. **Alignment**

The JAD Session started by aligning the workgroup with the agenda and purpose of the session. Ground rules were established, and the scope of this master's project was explained so that the participants could understand better the whole context. The main goals/outputs expected of the session were also presented.

It was presented what HR Analytics is, the types of Analytics, and the most common applications of HR Analytics to ensure the same minimum knowledge of HR Analytics across the members. The workgroup was then challenged to discuss in pairs how they would apply HR Analytics process to Payroll, Travel Allowances, Recruitment, Training, Performance Appraisal, and Attendance Data to consolidate their knowledge in the subject.

3.2.3.3. **Current State**

We then analyzed our HRIS's current analytics capabilities by exploring its different features, such as exporting data, organizing lists, among others, across all modules. The results of this analysis are presented in section 3.2.4.1.

3.2.3.4. **Our Competition**

After the group was aligned with what is HR Analytics and had a better understanding of what we currently have, we started to explore what the market is already offering. We researched for different HRIS suppliers and extracted the central Analytics' features they advertise. This method was a way of benchmarking our competition with what we have and a way to start gathering ideas for our system. The identified competition's features are presented in Appendix F, Table F.2: Analysis of the existing Analytics products' features.

3.2.3.5. **User Questionnaires**

Before we started envisioning what we wanted the HRAM to be, we analyzed the output of the questionnaires we had up until then. We were able to examine what HR Personnel, Managers, and C-level professionals think about HR Analytics, what they value the most in a system like this, and where they would apply it the most (Recruitment, Payroll, Training, among other HR responsibilities).

3.2.3.6. **Understanding our customers**

Throughout the JAD Session, the HR Business area defined two main users/profiles/interested parties in the HRAM. This step was taken so that when designing the Module, we would always consider for whom we are building the Module, their general profiles, skills, background, benefits they can get from a solution like this, and pains towards Analytics. The two main User Profiles defined were: Management (which encompasses C-level executives, Boards of Directors, Coordination Teams, among other roles) and the Human Resources Department.

Most of the inputs regarding the User Profiles were collected in the JAD Session but enriched through the Survey and Questionnaire results. The User Profiles were defined through four primary characteristics: Academic Background, Skills, and Competencies; Skills in HR Analytics; How they can benefit from HR Analytics; Pains using HR Analytics. The raw data from the JAD session is in Appendix F, Table F.3: Defining User Profiles.

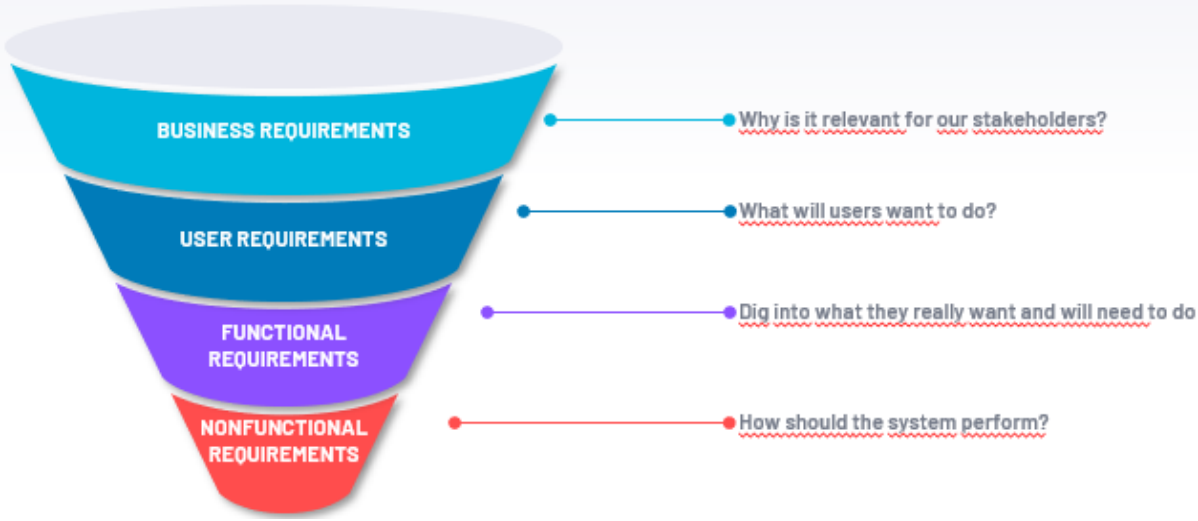
This activity was one of the starting points to define our Target User (Section 3.2.4.2) and the Customer Profile at the Value Proposition Canvas (Section 4.2.1).

3.2.3.7. **Start Envisioning**

Following this analysis, the group was divided into two trios. It was asked to define two main things: 1. Business Requirements, i.e., why is the system relevant for HR personnel and Management (such as CEOs, Board of Directors, Mid-level management), and 2. User Requirements, i.e., what will users want to do in an HRAM.

The elicitation of requirements followed the logic of defining the business requirements first so that our team had a clear idea of how the system could be relevant to all involved stakeholders. After having that clarified, we defined what users may want to achieve and do (*User Requirements)* when using the HRAM. Moreover, when those requirements were defined, we defined the functional and nonfunctional requirements. Therefore, the workgroup followed a sequence of defining the broadest requirements first and shortening the spectrum along the way to define more specific requirements (Figure 6).

Figure 6. *Requirements funnel, representing how the JAD workgroup started by defining the broadest requirements (business) to the most specific ones (nonfunctional)*



To brainstorm about the user tasks/requirements, it was asked to each trio to write sentences in the form of "*Users want to* _____ *so that they can* _____," which is a method called "*Job Stories*" (Google, 2021). This method enabled the workgroup to think about what users will want to do in an HRAM and justify why they want to do it. This activity was done with a short amount of time to bring a sense of urgency to the workgroup and make sure that all the ideas "came out." The objective was not to have very structured requirements by this point. That is why some of the results of this activity might seem unclear or incomplete (Appendix F, Table F.1: User requirements brainstorming).

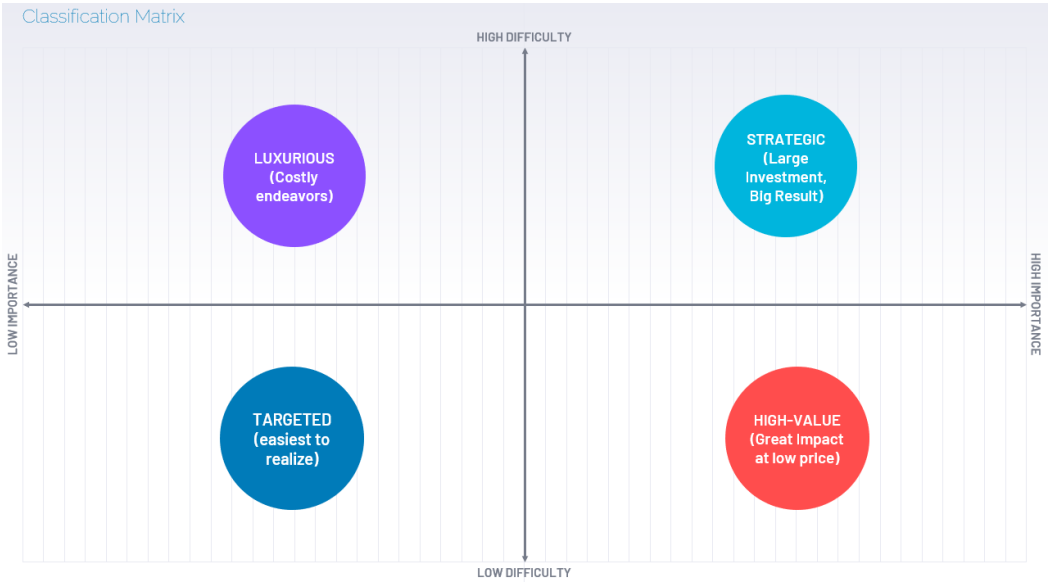
3.2.3.8. **Requirements Consolidation**

For Business Requirements elicitation, the group was divided into two trios. Each trio had to discuss and define how an HRAM can be relevant for three main stakeholders: HR, CEOs/Board of Directors/Management, and the Organization. After having those points defined, both trios had to consolidate what they had come up with and have a joint output.

For User Requirements, the same process was followed, i.e., the trios should come up with a joint output of User Requirements. After, two other methodologies were used for consolidation. The User Requirements were put on post-its, classified in an Importance/Difficulty matrix (**Figure 7**), and voted by the workgroup.

Regarding the *classification matrix*, the x-axis classified how important the user requirement was. The y-axis classified the difficulty of satisfying that requirement regarding technical, time, and knowledge resources. The items that fell into the *upper left quadrant* were *luxurious* because they are challenging to develop and have little importance. They are costly endeavors. The *upper right quadrant* items were classified as *strategic* since they require more effort but have significant results. The *lower left quadrant* represented *targeted* features/characteristics since they are the easiest to realize but are relatively less important. Finally, items that went to the *lower right quadrant* are considered of *high-value* items because they have a significant impact at a low price. The classification matrix is an excellent methodology for quickly prioritizing items and facilitating deliberation (Google, 2021).

Figure 7. *Classification Matrix (Importance/Difficulty)*



After the items were classified in the matrix, each workgroup member was granted five tokens, which they could use to vote as they pleased on the items displayed in the matrix. They could put the five votes in only one item or distribute it over several items. This methodology was used to highlight

the most relevant items and give the team the idea of where they should put their efforts first (Google, 2021). The results of the classification and voting of the first session are presented in Appendix F, Table F.5: Consolidated User Requirements of the first JAD Session.

3.2.3.9. Second Joint Application Development Session

After the first JAD Session, interviews were run, and we kept on receiving answers to the questionnaire. Based on the interviews and the questionnaire output, new User and Functional Requirements were added to the ones already defined by the end of the first JAD session.

Afterward, a second JAD Session was scheduled to present the main results of the questionnaire, the interviews, and consolidate the final user and functional requirements. In this second JAD Session, the group reviewed the whole list of consolidated requirements with everyone's inputs (JAD Session, interviews, and questionnaire) and made the changes they felt were needed. Then, the final output was classified again in the Importance/Difficulty Matrix and voted. This time, each participant had ten votes, which made a total of sixty votes. The reasoning behind this was that there were thirteen user requirements to vote on, so each workgroup member had to leave at least three user requirements with no vote.

The description of each user requirement that was voted is presented in section 4.3.

3.2.4. Joint Application Development Results

As already mentioned in section 3.2.3, the primary expected output from the JAD session was to have a clear and prioritized list of main functionalities of the HRAM. The results gathered in both sections are presented through sections 3.2.4.1 to 3.2.4.4.

3.2.4.1. Current Analytics' capabilities of Quidgest's Human Resources Information System

The HR Business Area of Quidgest will not start on a "clean slate." The current HRIS already provides Analytics functionalities and characteristics that were important to analyze before envisioning what we wanted to build.

These are the features that are already present in Quidgest's HRIS:

- **Metrics as the first view/page in some Modules**: Some Modules have "cards" with metrics related to that Module, but it is a feature that is not fully implemented.
- **Standard Reports:** The system provides users with several standard reports on various HR topics. These reports are static.
- **Specific Reports:** Quidgest's clients can acquire custom reports that will answer the organization's specific needs. The client provides Quidgest with the template of what they would like to be developed.

After a feasibility analysis by consultants and software engineers, it is embedded in the system for that client only.

- **Mandatory Reports:** One of the main features of the HRIS is that it automatically generates big and complex reports demanded by legal authorities. Although these are for legal reporting, they can also be used to analyze data about the workforce.
- **Lists:** Apart from all the automatic reports, processes, engines, and files that the system has, most of the system is based on the presentation of different lists. These can be filtered, sorted, and organized by the user. These lists give the user some flexibility to analyze high-level information about the employees.
- **Export Lists:** Most of the aforementioned lists can then be exported to PDF, Spreadsheet (.xlsx format), Comma-separated values (CSV), and XML format.
- **"CAV" (Advanced Consultation):** It is a tool that exports customized reports. Users can select the fields, conditions, groups, and totals they wish to analyze and save templates of exported reports. This functionality is transversal to Quidgest's systems, regardless of the business area.

3.2.4.2. To whom is the Human Resources Analytics Module targeted?

Most of the inputs regarding the User Profiles were collected in the JAD Session but enriched through the Survey and Questionnaire results which were analyzed at the JAD Session.

The User Profiles were defined across four primary characteristics:

1. Academic Background, Skills, and Competencies;
2. Skills in HR Analytics;
3. How can they benefit from HR Analytics;
4. Challenges when using or trying to implement HR Analytics;

Management: the members of the JAD Session considered that most Management Professionals have a background in the Science, Technology, Engineering, and Mathematics (STEM) field. In terms of skills in HR Analytics, they are keen to use data and generally understand quantitative methods (statistics, mathematics, econometrics), but miss the HR knowledge (which is also their most significant challenge in HR Analytics). Management can benefit from an HR Analytics tool by having better information about their workforce, which improves their decision-making processes through more objective HR decisions. Consequently, people-oriented policies will be improved, which may reduce costs, redundancy, and waste. In conclusion, Management will be able to retrieve the Return on Investment in HR Policies.

HR Professionals: They have an Academic Background in HRM, Management, Psychology, or Sociology. They have good communication skills, analytical thinking and are good team workers. They

are adaptable, innovative, and have good emotional intelligence. Regarding HR Analytics, the workgroup considered that HR professionals may have Beginner/Intermediate skills in Excel and can interpret data. However, they lack more advanced data analysis skills. That is why HR Professionals may benefit from an Analytics Solution due to the ease of analysis that the HRAM offers. They can develop better decision-making processes and improve the communication of those decisions with internal and external stakeholders.

These insights are based on the *raw data* presented in Appendix F*,* Table F.3: Defining User Profiles*.*

3.2.4.3. **Business Requirements. Why is it relevant for Quidgest's clients?**

Considering that we started to understand our customers better, we could better depict how an HR Analytics tool can benefit them. To do that, we defined Business Requirements. These are "*what define the overall goals of the system and help clarify the contributions it will make to the organization's success*" (Dennis et al., 2012, p. 105). The business requirements, in this context, are three folded: HR, CEOs/Management, and the Organization, meaning, how can the HRAM be relevant for these three stakeholders.

The main conclusions taken in the first JAD session regarding Business Requirements are presented in Appendix F, Table F.8: Business Requirements defined in the first JAD Session.

To consolidate the Business Requirements and user profiles defined in the first JAD session, we may draw the following conclusions in terms of the relevance of the HRAM for the three stakeholders:

- *For the Human Resources Department*, a system like this would be relevant to offset the effect of the lack of knowledge in technology (programming and data management). It can ease the task of accessing and managing significant volumes of diverse data. It structures and organizes data analysis processes, maintaining everything in one place (system) instead of having multiple spreadsheets with data. Also, the Module will allow an analysis of the HR data in real-time. Hence, the HR department will not depend on time-consuming processes or third parties to analyze or visualize the data compellingly. Furthermore, Analytics can be used in the whole Employee Life Cycle, from Recruitment to Off-boarding/Exit, which means that every HR Policy is prone to be improved through better Data-driven decisions. Likewise, through better decisions supported by data, the HR department is closer to being a *Strategic Partner*.
- The *CEOs/Management* may start taking HR data-driven decisions without depending solely on the Analytics' skills of the HR Department. They can better understand what HR is, does, and its impact on the organization and actively contribute to HR improvement. Furthermore, CEOs and

Management can better align with HR and understand how the function contributes to the business.

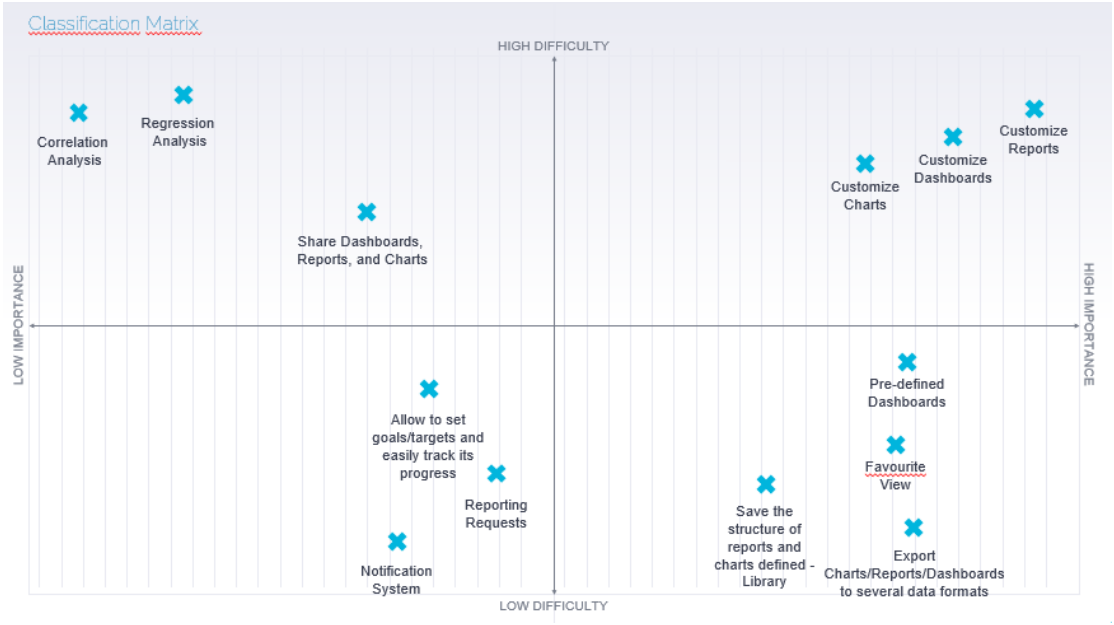
- *This strategic alignment between HR and Management is beneficial to the organization*. Moreover, it may improve the communication of HR both internally and externally by recurring to better data visualization.

3.2.4.4. **User Tasks/Requirements**

As explained before (section 3.2.3), the workgroup went through several dynamics throughout the JAD sessions to define and consolidate the system's primary user and functional requirements. The final output of user tasks/requirements that define the system's main functionalities, with the description of each User Requirements, is outlined in section 4.3 and the results that support the decision to include that requirement/functionality in the HRAM.

In Figure 8, it is possible to assess in more detail the position of each User Requirement. The importance attributed to the requirements is not "overall" importance, but relative importance in the context of the other requirements and what customers showed to value the most. For instance, correlation and regression analysis can have a significant impact on organizations when performed well. However, to prioritize, they were classified as the least important items of all. This prioritization does not mean that those features will not be developed. However, they will not be the first ones delivered to customers.

***Figure 8**. Final User Requirement Classification Matrix*



Chapter 4: Implementation

Throughout this chapter, the main goal is to gather and consolidate all the findings of this project. Quidgest will be presented in more detail and how the HRAM is aligned with its business goals. After, the HRAM characteristics and the customer profile will be summarized in a Value Proposition Canvas (Section 4.2), which intends to present a fit between what is planned for the system to be and HR Professionals' needs. The final user and functional requirements list are outlined in section 4.3, and the nonfunctional requirements are presented in section 4.4.

4.1. **Quidgest**

4.1.1. **Company's History, Mission, and Values**

Quidgest is a Portuguese company that works in the information technology sector. Founded in 1988, it is a pioneer in the modeling and automatic generation of Management Information Systems through its platform "*Genio*." Since 1992, this tool allowed Quidgest to become a reference in creating urgent, complex, and specific information systems since it is an excellent bridge between clients' business requirements and the output of the systems it produces.

According to its founders, Quidgest was created to contribute to significant growth in productivity of economic agents, actively participate in the technological revolution, and create a work environment that is a driver of innovation, continuous improvement, and self-actualization of its employees.

Today, Quidgest's mission is to be a company of excellence, a place where people enjoy working, focused on innovation, quality, and the development of each employee's competencies.

Quidgest employs more than 100 people involved in 12 different business areas, producing a vast number of different software solutions to various industries and sectors of business activity. Those are "Public Administration and Regulation," "Logistics and Asset Management," "Banking, Insurance, and Financial Services," "Document Management," "Engineering, Construction, Public Work, Energy, and Environment," "Research and Development," "Data Protection and Cybersecurity," "Quality and Strategic Management," "Human Resources," "Health, Sports, and Science," "Sensing and Internet of Things," and "Global Development."

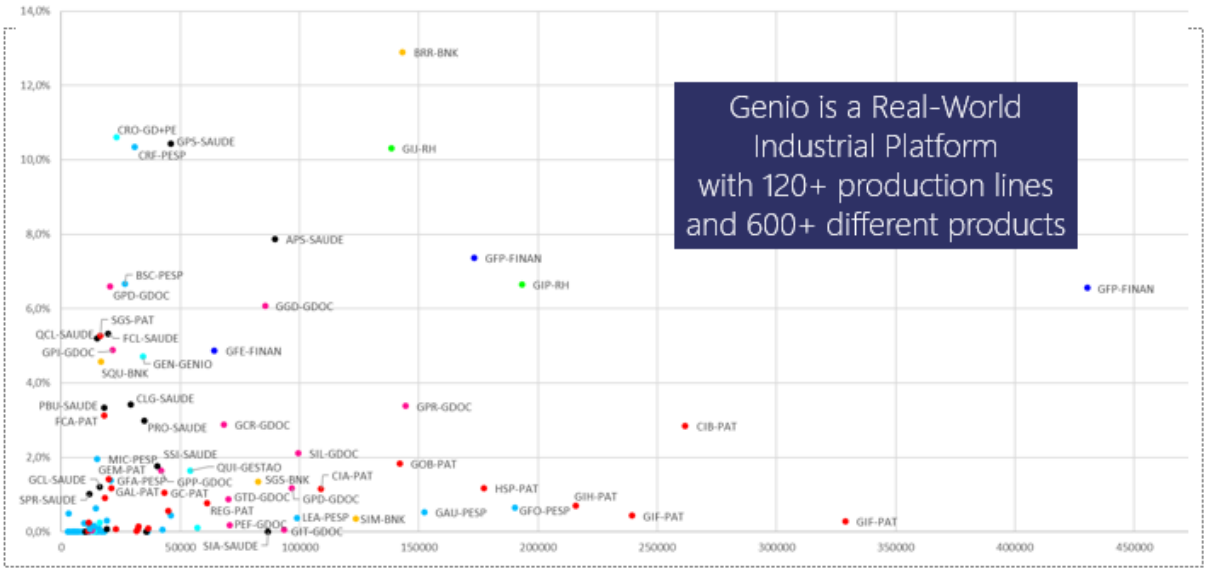
4.1.2. **Genio Platform**

Genio is a pattern-based framework able to transform even a large Model into an efficient software solution in less than 10 minutes. It has been used to develop a current portfolio of 600+ complex solutions, probably making Quidgest the largest management software producer in Europe.

Genio is considered an entirely declarative model of programming. In imperative programming, software engineers write the application's code that describes the steps to accomplish the goal. In declarative programming, software engineers build models that describe the goal.

Almost all solutions developed by Quidgest are well below the 10% mark of manual code as a function of code size by kilobyte (kB), which means that the amount of effort and time put into developing a system drastically decreases in comparison to the traditional way of programming.

Figure 9. *Quidgest solutions in the percentage of manual code in each system as a function of code size by kilobyte (kB)*



Note. From *GenioModel.pptx,* Quidgest (2019). Unpublished internal company document.

Due to all the factors presented above, Genio is considered the best bridge between the Business Needs (requirements) and the solution developed, i.e., delivering what the customer wants. Bearing in mind that the poor assessment and incorrect expression of requirements in what is developed are considered one of the major causes of IT projects to fail (Anton, 2003), Genio is a source of competitive advantage for Quidgest.

4.1.3. **Human Resources Business Area, and HRIS Solutions**

One of Quidgest's core business areas is *Human Resources*, which develops a wide range of Information System solutions inherent to the activities of Human Resources Management, such as Payroll, Performance Appraisal, Training, Recruitment, among others. Quidgest's HRIS solutions are implemented in over 30 national and international clients and manage over 80.000 employees. Some of its clients are the Government of Jamaica, ISCTE, NOVA University of Lisbon, among other public and private organizations.

Currently, Quidgest's HRIS Solution enables its customers to store and manage a wide range of HR data divided into "Modules" that customers may acquire separately. The main Modules currently

available are Human Resources Management, Payroll, Employee and Manager Self-Service, Performance Appraisal, Recruitment, Training, Attendance Management, Employee's Requests, and Travel Allowances. All modules are fully integrated, meaning that the data stored in one module are automatically reflected in others. For example, when using the Recruitment Module, and a candidate goes from candidate to official employee, the data gathered by that candidate during the selection process, and until then stored in the Recruitment Module, can be transferred to the Human Resources Management Module with just a click of a button.

4.1.4. **Product Alignment with organization and department strategy**

As outlined throughout the literature review, we can see that management and academic literature regard HR Analytics as a source of competitive advantage through gains in efficiency and effectiveness of better HR policies. Due to the low adoption of HR Analytics, we can consider that implementing it (or being a facilitator of its implementation) is an HR Management innovation that drives organizational performance (Marler & Boudreau, 2017). With that being said, we can state that this product is aligned with Quidgest's mission: "*Quidgest was created to contribute to significant growth in productivity of economic agents, actively participate in the technological revolution, and create a work environment that is a driver of innovation, continuous improvement, and self-actualization of its employees*."

Additionally, one of the critical drivers of Quidgest Growth for 2021 (Quidgest, 2021) was competitiveness catalyzed by the number of solutions released to the market. Hence, releasing an HRAM is also aligned with Quidgest's *modus operandi* of developing and releasing various complex solutions. We shall consider that the development of HRAM is aligned with the organization's mission and values.

In terms of being aligned with the HR Business Area objectives and strategy, we may assess the interview testimonials of the Manager of the department. When asked, "*How is the HR Module aligned with Quidgest's People Operations business' objectives?*" the manager stated that "*Our mission is to help HR managers develop and implement effective human resources management processes while making sure they have better data-driven decisions while they use our systems. While we currently have in our portfolio have software solutions that allow us to speed up processes and procedures, making sure all the core activities of an HR business partner can be automated, we have not made a shift to more data-driven solutions. Which I believe is the path to go.*"

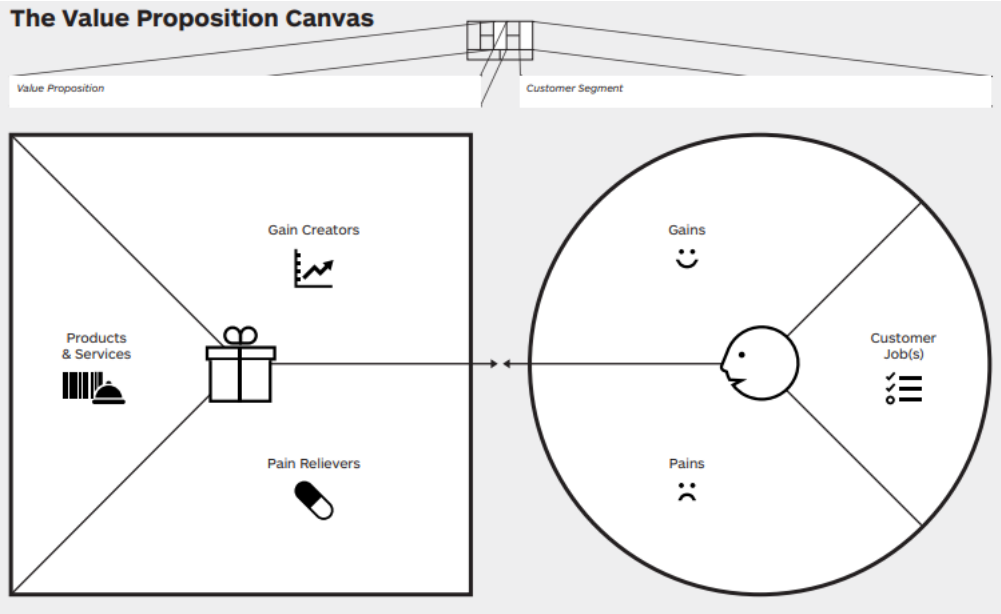
We can see an alignment between the corporate mission, values, strategy, and management support of the HR Business Area Manager. This alignment, commitment, and support are vital for the

success of any Information System project implementation (Purna Sudhakar, 2012; Wong & Tein, 2003).

4.2. Value Proposition Canvas

This project uses the Value Proposition Canvas (Osterwalder et al., 2014) to consolidate the customer/user profile, pains, gains, and how the HRAM benefits them. The Value Proposition Canvas comprises a Value Map, a Customer Profile, and a Fit between them. This fit is achieved "*when the product produces pain relievers and gain creators that match one or more of the jobs, pains, and gains that are important to your customer*" (Osterwalder et al., 2014, p. 9).

Figure 10. *Value Proposition Canvas*



Note. From *Value Proposition Design* (1st ed., p. 61), by Osterwalder, A., Pigneur, Y., Bernarda, G., & Smith, A., *2014, John Wiley & Sons, Inc., Hoboken, New Jersey.*

4.2.1. Customer Profile

The Customer Profile is a method that "*breaks down the customer into its jobs, pains, and gains*" (Osterwalder et al., 2014, p. 9). In this project, the customer profile is one of an HR Professional. Although "Management" can also be considered a Customer (and probably the decision-maker in the acquisition of the HRAM), this project was built around the premise of answering HR Professionals' needs and pains. Moreover, Osterwalder et al. (2014) allude to the mistake of trying to "*mix several customer segments into one profile*" (p. 24). Therefore, we shall focus on HR Professionals and the fit between their profile and the HRAM.

The **Customer Jobs** is a sum-up of *functional jobs* (the tasks the customer tries to complete, or problem it tries to solve), *social jobs* (how the customer wishes to be perceived by others), and *personal/emotional jobs* (how the customer is trying to feel).

The **Customer Pains** are the sum-up of variables that prevent the customer from completing or achieving its Jobs. They are the *undesired outcome*, problems, characteristics that customers do not like, *obstacles* that customers face, and *risks* (undesired potential outcomes).

The **Customer Gains** are the benefits customers want. They can be *required gains*, minimum expectations that customers have towards a product or service, *expected gains*, basic gains/expectations users have, *desired gains*, characteristics that customers would love to have, but are not the basics, and *unexpected gains* (those that go beyond customer expectations and desires).

The customer profile presented below (Table 1) is a consolidation of the findings of this project regarding the customer/user profile of HR professionals towards HR Analytics.

Table 1. Customer Profile: HR Professionals

<table>
<tr><th>Customer Jobs</th><th>Pains</th></tr>
<tr><td rowspan="3">- Manage the whole employee life cycle
- Report to Management about the workforce
- Manage internal communication
- Improve Employer Branding
- Attract the best talent
- Improve retention rates
- Improve employee satisfaction
- Seeking to improve people-oriented strategies continuously</td><td>- Small HR Departments for big organizations which leads HR to deprioritize HR Analytics (Lack of time)
- Lack of knowledge in Analytics
- Lack of Technology and Software to perform HR Analytics
- Management Support and buy-in to kick start those processes
- Bad HR Data Management
- Low awareness on how to start HR Analytics processes</td></tr>
<tr><th>Gains</th></tr>
<tr><td>- Be closer to Management by making data-driven decisions
- Measure ROI of HR
- Ability to justify HR Activities and draw investment to the area
- Quickly build HR Data visualization through different methods
- Have a tool that helps to predict how the workforce will evolve
- Easily share HR data to management, to the workforce, and partners
- Use HR data to improve HR Policies
- Flexibility to use other tools at the same time</td></tr>
</table>

4.2.2. **Value Map**

The Value Map "*describes the features of a specific value proposition in your business model in a more structured and detailed way. It breaks your value proposition into products and services, pain relievers, and gain creators"* (Osterwalder et al., 2014, p. 8).

The "Products and Services" list the main physical/tangible, intangible, digital, and financial characteristics on which the value proposition of a product or service is built. Pain relievers "*explicitly outline how you intend to eliminate or reduce some of the things that annoy your customers before, during, or after they are trying to complete a job or that prevent them from doing so*" (Osterwalder et

al., 2014, p. 31). Gain Creators "*explicitly outline how you intend to produce outcomes and benefits that your customer expects, desires, or would be surprised by, including functional utility, social gains, positive emotions, and cost savings*" (Osterwalder et al., 2014, p. 33).

The Value Map presented below (Table 2) is based on the findings and results of this project. The "Products and Services" are a result not only of what was defined as the main functionalities of the system in the JAD session but also has elements that Quidgest already has in place (e.g., "support system" or being "GDPR compliant").

Table 2. Value Map HRAM

<table>
<tr><th>Products and Services</th><th>Pain Relievers</th></tr>
<tr><td rowspan="3">- Ability to customize charts, dashboards, and reports
- Ability to set goals/targets and easily track its progress
- Have a library of customized reports, charts, and dashboards
- Notification System
- Ability to have a favorite view to track main metrics and KPIs
- Export function to different data formats
- Support system (helpdesk)
- Sharing features
- Web-based solution to be accessed everywhere, at any time
- User Access Management (different permission inside the system)
- GDPR compliant
- Fully integrated system
- Fast development with Genio
- Certified for Data Security</td><td>- Offset the lack of knowledge in Technology (programming and Data Management) by having structured methods and tools to analyze data
- Ease the task of accessing significant volumes of diverse data. There is no need to run extra ETL processes to manage and analyze data
- Structures the data analysis processes
- Analysis in real-time
- A fully integrated system, i.e., no need to move from platform to platform to analyze the data</td></tr>
<tr><th>Gain Creators</th></tr>
<tr><td>- HR closer to being a strategic partner
- The HR department will not depend on third parties to have the data analyzed or visualized in a captivating manner
- Strategic Alignment with HR and Management
- CEOs and Management can understand better how HR may contribute to the business overall
- Improvement of the whole employee life cycle
- Save time and money due to less time-consuming tasks of treating data for analysis
- Make data-driven decisions
- Improve the communication of HR (internally and externally)</td></tr>
</table>

4.2.3. **Fit**

Throughout the development of this project, interviewees, responders of the questionnaire, and the workgroup of the JAD Sessions put much emphasis on the ease of analysis that a solution like this can bring to its potential users. We found it relevant for our target customers to retrieve organized data from the HRIS and translate it into insights for the business through data visualization. Even if our current and potential customers are already performing HR Analytics processes, they are probably

sustained in timely and costly practices. The HR Analytics tool can also deliver much value through money and time savings. As interviewee G mentioned, "*This thing of having to take the data from one side, then work on it, and then do the ETL*[2] *part manually... we want to do it without that process and have this integrated into one place. (…)* (if we can) *forego this middle part which is the most boring and least interesting and most labor-intensive... If we can have software tools that do that for us, that is what we want.*".

One should also consider that HR has been evolving from administrative tasks to a strategic partner of the organization in the past few years (Kapoor & Kabra, 2014). The discussion about being a true "Human Resources Business Partner" is not new but is still not over. Taking data-driven decisions towards the workforce might well be one of the major steps missing to "close" that discussion. Hence, a system like this can relieve many pains of HR professionals due to the lack of knowledge and skills in Analytics and help them be *Strategic Partners*.

In practical terms, customers are looking for a way to start the descriptive level of analytics by having a tool that provides more agility and support in creating dashboards, generating custom reports and charts without moving the data from the system to other places. We have planned to develop this functionality, and in fact, Quidgest and the HR Business Area have already developed similar characteristics (as mentioned in section 3.2.4.1, we already have a system to generate reports and pre-defined dashboards, for example). It is just a matter of upgrading and integrating the current solutions available to meet our customers' needs.

Customers also have concerns regarding the system. Most of the concerns identified were related to being GDPR-compliant, securing the data, and managing access in terms of permissions of different users. Genio's solutions already incorporate all the security components needed in our products. Moreover, Quidgest is certified with ISO/IEC 27001[3] for data security management. Our solutions are GDPR-compliant, and we have already implemented a method to manage access to the system. For instance, there are roles defined, such as the "administrator" role, which has access to everything in the system, "consultation" role, which only has permissions to visualize the data. Moreover, since our solution is built in a Modular way (Payroll Module, Recruitment Module, among others), it is possible to define the type of access each user has to the different modules.

[2] *"ETL, which stands for extract, transform and load, is a data integration process that combines data from multiple data sources into a single, consistent data store that is loaded into a data warehouse or other target system."* (IBM Cloud Education, 2020)

[3] "*ISO/IEC 27001 is widely known, providing requirements for an information security management system (ISMS), though there are more than a dozen standards in the ISO/IEC 27000 family. Using them enables organizations of any kind to manage the security of assets such as financial information, intellectual property, employee details or information entrusted by third parties."* (ISO, 2021)

4.3. User and Functional Requirements

As shown in section 3.2.4.4, the second and last JAD Session was used to consolidate, vote, and prioritize the user requirements gathered until then. All the requirements defined and presented in *this section* are the ones to be developed in the first phase of the HRAM. These are the brief descriptions of each user requirement:

- **Create and Customize Charts:** Have multiple chart types to choose from (pie chart, bar chart, and others) and multiple preset variables to allocate to the different axis of the charts.
- **Create and Customize Dashboards:** Users should be able to create and customize dashboards.
- **Visualize pre-defined Dashboards:** The system should provide pre-defined dashboards by the most relevant HR Topics. These dashboards shall be automatically updated.
- **Set goals/targets and easily track them:** Have a specific dashboard of charts, like gauges, where users can define goals/targets and quickly check where they stand. This menu should enable the user to categorize the target according to importance, priority, and deadlines.
- **Customize Reports:** Ability to choose different fields from the system for rows and columns to generate custom reports. There should also be the possibility to add the charts created in the Module to the report itself.
- **Library:** Save the structure of reports, charts, and dashboards created by the users. When a user creates a report, chart, or dashboard, it should be possible to save the structure defined as a template for future use by the user itself or by other users of the Module.
- **Share materials with co-workers:** Send reports by e-mail or as a link from the system to the desired parties. Also, it should be possible to share the dashboards, reports, and charts through the Employee and Manager Self Service.
- **Notification System:** Have a notification area to notify users when specific reports, dashboards, and charts are downloaded/updated. Also, integrate this feature with the sharing feature, i.e., notify users when something was shared with them.
- **Favorite View:** Users should have the possibility to create a dashboard on their homepage that is unique to the user. Every time they open the module, their favorite dashboard is the first thing they see.
- **Export to several data formats:** Users should be granted the possibility to export the different components of the system into Excel, Word, PDF, PNG or j.peg, and CSV formats.
- **Reporting Requests:** Create a request workflow inside the system so that employees and managers can request specific charts, reports, and dashboards through their Employee Self Service, and the HRAM Users receive it. The Module users should have prioritization features that enable them to manage their work better to deliver what was requested by other users.

- **Correlation Analysis:** Ability to choose predefined variables to run a correlation analysis and translate the output of the analysis into information.
- **Regression Analysis:** Ability to perform Linear and Multiple Regression Analysis. Choose predefined variables and have a clear analysis output (graph of the model, coefficients, and model validity).

Table 3 summarizes the list of user requirements with research findings. It shows their classification ("*Class.")* on the importance/difficulty matrix and the number of votes ("*votes"*) granted in the last JAD Session. It also shows how many interviewees referred to that requirement ("*Interviews"*). The percentage of responders to the questionnaire chose that requirement as one of the top 3 Analytics functionalities they would like to see in an HRIS is also displayed ("*Question. Top 3*").

Table 3. *Consolidated list of user requirements with research findings*

User Requirement	Class.	Votes	Interviews	Question. Top 3
Customize Dashboards	Strategic	10	4 (50%)	71%
Customize Reports	Strategic	8	3(37,50%)	50%
Share content **with co-workers**	Luxurious	6	2 (25%)	
Customize charts	Strategic	5	4 (50%)	
P**re-defined Dashboards**	High-value	5		88%
Library	High-value	5		
Notification System	Targeted	5	2 (25%)	
Set goals/targets, and easily track them	Targeted	4	2 (25%)	
Favorite View	High-value	4		
Export to several data formats	High-value	4	2 (25%)	
Regression Analysis	Luxurious	3	2 (25%)	3%
Correlation Analysis	Luxurious	1	2 (25%)	36%

Each User Requirement is then complemented with functional requirements. These are what better define the functionalities of the system. The list of functional requirements is presented in Appendix F, Table F.9.

4.4. Nonfunctional Requirements

Nonfunctional requirements were divided into four main categories: 1) Operational, meaning the physical and technical environments in which the system will operate; 2) Performance, which defines

minimum requirements in terms of speed, capacity, and reliability of the system; 3) Security, that define things like who has the authorization to access the system, or which parts of the system and track the activity inside the system for future audits; 4) Cultural and Political, which concern the legal and cultural requirements that affect the system.

Considering that the HRAM will be based on the current Quidgest's HRIS and that this type of requirement is not oriented to functionalities of Analytics *per se,* the gathering and elicitation process of nonfunctional requirements was different. Hence, internal research was run to gather past projects' different "Requirements matrices" to identify the main nonfunctional requirements.

Nonetheless, the Interviews and Questionnaires were also a good source to identify the main concerns of potential users when working with a system like this (results of gathering nonfunctional requirements through interviews at section 3.2.1.3, and questionnaires at section 3.2.2.2).

The list of nonfunctional requirements presented in this project is the output of what the HRIS already has. Furthermore, through the Interviews and Questionnaire, we can confirm that it meets the main concerns of users regarding performance, usability, security, legalities, among others.

The whole list of nonfunctional requirements is presented in Appendix F, Table F.7: Nonfunctional requirements. Some of its key components are, for instance, the fact that the system is web-based, enabling its users to access it on any mobile device (Laptop, tablet, or phone). Moreover, in terms of accessibility, Quidgest already has a program that enables users and administrators to manage who has access to what. In terms of security, Quidgest is certified with ISO/IEC 27001 and ensures tests of performance and penetration to the system to guarantee Data Security.

Chapter 5: Conclusion

5.1. **Why should Quidgest build the Human Resources Analytics Module**

Throughout the development of this project, evidence shows that HR is joining the Analytics revolution (Berisford et al., 2014), after the areas of finance, sales, logistics, health, sports, and others, have demonstrated how a data-driven approach can improve their outcomes (Gepp et al., 2017; Mitra & Mitra, 2012; Souza, 2014; Wang et al., 2016; Wedel & Kannan, 2016). Now, HR is starting to use data to make better decisions towards the workforce, and through that, become a real Strategic Partner for the Organization. Analytics is shaping how HR does workforce planning (Chalutz Ben-Gal, 2019; Isson & Harriott, 2016), recruitment (Escolar-Jimenez et al., 2018), measures and acts on engagement (Tomlinson, 2010; van der Togt & Rasmussen, 2017) and turnover (Allen et al., 2010; Rombaut & Guerry, 2018), and how it manages employees' performance (Escolar-Jimenez et al., 2019; Luo et al., 2019; Nicolaescu et al., 2020).

Considering the diverse and complex combination of skills needed to succeed at Analytics, as shown in section 2.6, the HR function has faced several challenges in implementing and developing Analytics practices. These obstacles and barriers are related to HR data management, the available software and technology, the knowledge and skills that HR professionals have on Analytics, and Management support in HR Analytics implementation (Fernandez & Gallardo-Gallardo, 2020).

Nonetheless, the growth in HR data volume due to digitalization leads to the expectation that HR Analytics will continue to grow and improve its impact on organizations' performance (van der Togt & Rasmussen, 2017). The growth in data, linked to an increased interest by Management and HR professionals in implementing Analytics practices (Bersin et al., 2017), induces us to believe that Quidgest's HRIS should have more and better Analytics' capabilities to drive new sales and improve customer retention. Furthermore, Quidgest has already organized significant amounts of workforce data for its client, which, as van der Togt & Rasmussen (2017) state, "*already generates 80 percent of the value without sophisticated analytics because it allows fact-based diagnostics and decisions*" (p. 128). Now, it is just a matter of having a tool that eases the processes related to data analysis to drive better business results for our customers.

Resorting to the SDLC structure by Dennis et al. (2012), several methods (interviews, questionnaire, and 2 JAD Sessions) were used to gather and elicit the new HRAM Requirements. The data collected throughout this project shows that potential stakeholders of an HRAM consider that Analytics' capabilities are very important in an HRIS. Potential users recognize the relevance of having a fully integrated system and the ease of analysis it can bring by having data ready to be analyzed in real-time and shared with different stakeholders. Overall, HR professionals have shown that they see

it as a path to a more strategic role inside the organization. Moreover, it also identified the primary functionalities users value the most and should be developed in the HRAM. They were prioritized through an Importance/Difficulty Matrix, which will help the Quidgest team define what to focus on and deliver first to its clients. Nonfunctional requirements were also gathered and elicited, which describe the system's main operational, performance, security, and cultural and pollical characteristics (Dennis et al., 2012).

To consolidate all the project's results, a Value Proposition Canvas was developed, summarizing the customer jobs and the products and services of the HRAM, the main pains and gains of customers, and pain relievers and gains creators of the Module. This methodology sought to outline a fit between the HRAM and how it answers specific customer needs.

The foundations to develop the new HRAM for Quidgest are defined. With the correct market positioning, it can be a great added value to current customers and a product to attract new clients. Consequently, it may improve customer retention and add a new revenue stream to Quidgest. Additionally, since Quidgest is still not aligned on what it provides in terms of Analytics capabilities in its other Information Systems, the knowledge gained through the development of this project can later be applied to other Business Areas.

5.2. Challenges and Limitations

Strong presence in the public sector: a threat and an opportunity. Quidgest main client base is composed of organizations of the public sector, which is often characterized as having a culture of risk aversion and an over-reliance on bureaucratic tradition, which impedes innovation (Mulgan & Albury, 2003; Vigoda-gadot et al., 2005). These characteristics can be a threat to the diffusion of the product within the current clients. Nonetheless, it may be an opportunity to "open doors" in some private sector clients by delivering this high demand and low supply service.

Low insight from current clients. Although the questionnaire was distributed among clients, only four responders stated they were Quidgest's clients. In terms of interviews, only one person of a Quidgest client was interviewed. The insights of current users were considered of high importance since those are the ones who already know the HRIS in place and what it can do. Hence, the user inputs would be easier to translate into requirements. It needs to be ensured that current users are more involved in the subsequent development cycles of the HRAM.

Analytics knowledge within the HR Business Area and Quidgest. Although the technological skills and the HR knowledge are present, there is still a knowledge gap towards HR Analytics that needs to be filled. There should be a training investment in quantitative methods and data visualization

techniques to the team responsible for developing the HRAM to deliver a relevant Analytics service to customers.

Excel vs. Module: The investment needed to develop the system from the Quidgest side and the client's investment to acquire the system will amount to several thousands of euros from each side. The several tools available in the market in terms of data analysis (some open-source or with a residual value for the organization) are one of the biggest threats for the product. What will be developed needs to justify the trade-off between having the HRAM, which eases the analysis processes, or using the current tools available that will require more labor-intensive work in terms of data management.

From "nice to have" to "must-have": The fact that HR Analytics practices and importance are still not well diffused can significantly hinder the product's implementation. As interviewee H said (the HR Analytics consultant), "*I think 80% to 90% of the companies in Portugal do not use HR Analytics. And they do not even know it".* Quidgest's team may have a double task in hand: First, prove it is relevant for the users to have HR Analytics processes, and second, prove that this Module improves HR Analytics processes.

5.3. **Next Steps**

According to the SDLC framework of Dennis et al. (2012), there are five main phases of developing a system as presented in the Literature Review. We may consider that through the development of this project, most of the Planning and Analysis phases are done. It is identified who is the project sponsor (Quidgest and the HR Business Area), why it is relevant, on the customer side, to build the system (Business Requirements), to whom is it targeted, and its main functionalities (user, functional, and nonfunctional requirements).

When (and if) Quidgest considers this project relevant to allocate resources to, I propose the following next steps for successful project implementation:

- *Project Plan, Resource Allocation, and Methodology.* One of the first steps is to gather a team responsible for developing this project and plan its development. Estimations should be done regarding the several stages ahead, defining and assigning responsibilities. Moreover, there should be a detailed financial plan, marketing strategies to position the product in the market, and a choice of work methodology. Today, most software development is sustained in Agile Methodologies such as Scrum (Srivastava et al., 2017). However, others can be better suited for the context in which this project is developed. For instance, Dennis et al. (2012) propose several methodologies considering the different project variables, such as how clear requirements are, how familiar the technology used is, if it is a complex project, timeline/deadlines, among other variables.

- *Develop Use Cases, Process Models, and Design Interfaces.* This project focused on defining the main business, user, functional, and nonfunctional requirements, the foundations of any system, and considered the "*single most critical aspect of the entire SLDC*" (Dennis et al., 2012, p. 104). It is time to translate the user requirements identified into how they can be reflected in the system by defining use cases, process models, and designing interfaces.

Use cases illustrate each user requirement in terms of its description, identify trigger events and standard and alternative courses that the user may take in the system. These use cases are what help "*understand the situation* (of the user) *and help convey the required user-system interactions*" (Dennis et al., 2012, p. 150).

Process modeling is a set of tools used in the form of data flow diagrams and logical process models, which graphically describe the activities that people do in the system. These models outline the possible activities and paths to reach a particular outcome and how data flows through those paths (Dennis et al., 2012).

At last, it will be essential to define the *user interfaces*, i.e., outlining how the system will look like, how users will be able to navigate in it, how it will be organized in terms of menus, which type of messages and alerts the system will deliver to the user, among other things.

Since the number of Quidgest's clients that participated in this process was low, it would be wise to involve and listen to what current system users have to contribute in this phase.

- *Start developing.* Much emphasis has been put on the planning, analysis, and design of the system. However, it is essential to start to develop the System itself and not be paralyzed by possible validations on whether or not to develop a system. Agile methodologies have shown the importance of developing iteratively and bringing the product to the market as soon as possible (Minimum Viable Product). The actual test will be the users and real customers. Only with their feedback is it possible to understand if the team is steered in the right direction and not lose months and months on development, only to see much later that what was developed is not answering any customers' needs (Agile Alliance, 2021).
- *Short- and Longer-Term Development.* In the short term, Quidgest should focus on the user requirements that were considered *High-value*. They are considered the most important and the easiest to develop. Hence, the team should start by building the pre-defined dashboards, allowing the users to choose which dashboard they would like to have as their favorite view and export those dashboards to several formats. The goal is to deliver value fast to customers and attract them to the Module.

That would also give us more time to develop the *Strategic* User Requirements, which are very important but challenging to develop. In this category, we have the customization of

dashboards, reports, and charts. In parallel, we develop the library to save templates (*A high-value* requirement).

After the *High-Value* and *Strategic* User Requirements are implemented and stable in our clients, we could then move on to the *Targeted* Requirements (Low importance and low difficulty) and the *Luxurious* Requirements (Low importance, high difficulty).

As we can see, the HRAM, in the first stage, will focus much of its efforts on delivering good data visualization to its users and more flexibility in analyzing data and reporting it. We can say we are at a *Descriptive Analytics level.* For the long-term, Quidgest should start moving on to a more advanced level of Analytics to deliver predictive and prescriptive models and insights without much data manipulation by the users. These developments would include more advanced versions of the luxurious items defined (Correlation and Regression Analysis).

5.4. Moving forward

Strong arguments have been made in favor of HR Analytics. Literature shows that its implementation brings HR closer to being a Business Strategic Partner. It catalyzes better decision-making processes, improves overall employee engagement and performance, and that HR should own its data before others do. Furthermore, the findings of this project also convey that HR professionals and Management are interested in implementing Analytics processes. However, they lack the skills and tools to do it.

Therefore, this project is relevant because it built the foundations for Quidgest to adopt this innovative subject and use the list of elicited requirements to develop a new system that may improve its competitiveness. Moreover, this project contributes to the advancement in HR Analytics, in practical terms, by merging different fields (Technology, Quantitative Methods, and Human Resources) that are often difficult to combine.

HR Analytics is a growing trend, and customers will increasingly require these functionalities to be inserted in their HRIS. Now, for Quidgest customers, the HRAM may be a “nice to have,” as it is for Quidgest HR Business Area in terms of its portfolio of solutions. However, soon it will turn into a “Must have.” This project shows that Quidgest has here the opportunity of truly helping HR Professionals be Strategic Partners and uphold its mission of contributing to more efficient, effective, and innovative organizations.

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Appendix A

Interviews' form of informed consent, Guideline, Categories, Results, and Excerpts

Form of informed consent

Form of informed consent

Enterprise Project in the scope of the Human Resources Management and Organizational Consultancy Master's Degree

Author: Miguel Fontes de Araújo Gaspar

The current project aims to gather the main requirements of Human Resources Professionals, Managers, and CEOs, for a Human Resources Analytics Module, for Quidgest, in the scope of the Human Resources Management and Organizational Consultancy Master's Degree.

I intend to develop this project to justify why Quidgest should invest in the development of this Solution and understand better what HR professionals and other stakeholders are looking for in a System like this. Likewise, your participation is very important.

I ask for your contribution to this project through participation in a semi-structured interview, which will be recorded and transcribed for further analysis in the scope of the project. The data, information, and answers provided will be exclusively used for the purpose of this project. Your participation is anonymous, and the only information to be disclosed in the project is your role at your organization (the organization will not be disclosed), years of experience in Human Resources, Gender, and Academic Background.

Your participation is voluntary, and you may interrupt, withdraw, and refuse your involvement at any moment.

☐ After acknowledging the objectives of the interview, I declare that I accept to participate in this study, and I authorize the recording of the interview

_____

Interviewee's name:

Role:

Lisbon, ____ of _____, 2021

_____

Interviewer: Miguel Gaspar

Student no. 90195, MSc Human Resources Management and Organizational Consultancy

Interview Guideline

Person Interviewed:

Role:

Date:

Introduction to the interview:

Good Morning. Thank you in advance for your presence and collaboration in the interview.

My name is Miguel Gaspar, and I am a student of the Master in Human Resources Management and Organizational Consulting at ISCTE and an employee at Quidgest.

I'm currently developing the project's planning and analysis phase of the new HR Analytics Module of Quidgest in the context of my Master Thesis Final Project. This interview is, therefore, intended to support this study.

So that I can make a correct analysis of what will be said in the interview and in order to ensure that there is no loss of information, I would like your consent to record an audio interview, which will be used exclusively for the purpose of this study. Do I have your permission?

Questions:

1. What is HR Analytics for you?
2. Do you use or have you used any HR Analytics processes? If yes, what have you done in the field of HR Analytics? If no, why not?
3. If yes, do you believe they brought any added value to your work? How?
4. What main features would you look for in an HR Analytics service?
5. In which HR practices (e.g., compensation and benefits, recruitment, training, etc.) would you use HR Analytics processes the most?
6. What would be your main concerns regarding usability and performance when acquiring and using an HR Analytics service?
7. What do you believe should be the main value-added/ features of Quidgest's HR Analytics service that will make it distinctive from the competition?

Table A.1: Interview Categories

Category	Sub-category	Sub-sub-category
CB: Challenges and Barriers with HR Analytics	LT: Lack of Time	N/A
	MS: Management Support	
	KCS: Knowledge, Skills, and Competencies related to HR Analytics	
	TA: Technology and Software available to perform HR Analytics that meets the needs and context of HR Professionals	
	DM: Data Management	
PA: HR practices/topics currently under analyzes or that the interviewees feel would be analyzed the most with an HRAM	WFP: Workforce Planning	N/A
	DI: Diversity and Inclusion	
	DEM: Demographics	
	ENG: Engagement	
	PAP: Performance Appraisal	
	REC: Recruitment	
	ATT: Attendance	
	ON: Onboarding	
	TUR: Turnover	
	TRA: Training	
	PAY: Payroll	
R: Requirements	BR: Business Requirements	SO: Ability to share content on demand. The emphasis is not on real-time data but to be able to "update" and share the dashboards and

		reports when there is certainty about the quality of the data in the source
		OT: Integration with other tools
		PRE: Predictive Components
		RT: Data in Real-Time
		HRBP: With a solution like this, HR is closer to being a Strategic Partner
		ROI: Ability to measure Return on Investment in HR
		EA: Ease of Analysis that a solution like this can bring to HR professionals and the organization
		INT: Fully integrated system
	U: User Requirements	NOT: Notification System
		CV: Custom Views or Favorite Views
		BN: Benchmarking
		GA: Guided Analysis
		RE: Regression and Correlation Analysis
		CR: Correlation Reports
		CD: Customize Dashboards

		CC: Customize Charts
		MK: Monitor Metrics and KPIs
		S: Sharing Features
		C: Make calculations when customizing dashboards, reports, lists, and charts
		E: Export Function
		G: Ability to set goals or targets and easily track them in the system
	NFR: Nonfunctional Requirements	ACC: Access Management
		GDPR: The system should be GDPR-compliant
		SEC: Data Security
		FE: The system should be fast and efficient

Table A.2: Interviews' Sample

INTERVIEWEE	ROLE	ACADEMIC BACKGROUND	PROFESSIONAL EXPERIENCE IN HR	GENDER
A	HR Generalist	HR Management	2	Female
B	Recruitment & Selection	Psychology	5	Female
C	HR Generalist	HR Management	2	Female
D	HR Business Area Manager	HR Management	>10	Male
E	HR Generalist	Sociology	3	Female
F	HR Consultant	HR Management	3	Male
G	Quidgest's client		0	Male
H	HR Analytics consultant	HR Management	7	Male

Table A.3: Interview Results

Sub-category	***Absolute Frequency[4]***	***Relative Frequency***	***Number of times referred in total***
CB-LT: Lack of Time	1	12,5%	1
CB-MS: Management Support	3	37,5%	4
CB-KCS: Knowledge, Skills, and Competencies related to HR Analytics	7	87,5%	17
CB-TA: Technology and Software available to perform HR Analytics that meets the needs and context of HR Professionals	7	87,5%	17
CB-DM: Data Management	4	50%	5
PA-WFP: Workforce Planning	1	12,5%	1
PA-DI: Diversity and Inclusion	1	12,5%	1
PA-DEM: Demographics	3	37,5%	3
PA-ENG: Engagement	1	12,5%	1
PA-PAP: Performance Appraisal	5	62,5%	5
PA-REC: Recruitment	5	62,5%	7
PA-ATT: Attendance	3	37,5%	4
PA-ON: Onboarding	3	37,5%	3
PA-TUR: Turnover	5	62,5%	7
PA-TRA: Training	5	62,5%	7
PA-PAY: Payroll	6	75%	7
R-BR-SO: Ability to share content on demand. The emphasis is not on real-time data but to be able to "update" and share the dashboards and reports when there is certainty about the quality of the data in the source	1	12,5%	2

[4] Number of Employees who referred to this sub-category

Sub-category	**Absolute Frequency**	**Relative Frequency**	**Number of times referred in total**
R-BR-PRE: Predictive Components	3	37,5%	6
R-BR-RT: Data in Real-Time	1	12,5%	2
R-BR-HRBP: With a solution like this, HR is closer to being a Strategic Partner	2	25%	2
R-BR-ROI: Ability to measure Return on Investment in HR	1	12,5%	2
R-BR-EA: Ease of Analysis that a solution like this can bring to HR professionals and the organization	6	75%	11
R-BR-INT: Fully integrated system	5	62,5%	8
R-U-NOT: Notification System	1	12,5%	1
R-U-CV: Custom Views or Favorite Views	1	12,5%	1
R-U-BN: Benchmarking	1	12,5%	1
R-U-GA: Guided Analysis	1	12,5%	1
R-U-RE: Regression and Correlation Analysis	2	25%	4
R-U-CR: Correlation Reports	3	37,5%	8
R-U-CD: Customize Dashboards	4	50%	10
R-U-CC: Customize Charts	4	50%	7
R-U-MK: Monitor Metrics and KPIs	2	25%	2
R-U-S: Sharing Features	2	25%	5
R-U-C: Make own calculations when customizing dashboards, reports, lists, and charts	2	25%	2
R-U-E: Export Function	2	25%	2
R-U-G: Ability to set goals or targets and easily track them in the system	2	25%	2

Sub-category	**Absolute Frequency**	**Relative Frequency**	**Number of times referred in total**
R-NFR-ACC: Access Management	2	25%	3
R-NFR-GDPR: The system should be GDPR-compliant	4	50%	4
R-NFR-SEC: Data Security	4	50%	5
R-NFR-FE: The system should be fast and efficient	6	75%	6

Table A.4: Interviews' Excerpts

Interviewee	Category (codes)	Outlined Text
Interviewee A	PA\ATT	Weekly we must report to the plant director, as to the productivity director number of hours worked, number of hours of absences. Since we work in shifts, we see the number of workers we have per hour, and then we see the productivity of the factory itself. Parts produced and number of hours worked, for example. We do analysis within the different groups of workers, the operators, the managers, the technicians. We also organize by type of contracts as well, and that helps us to better manage contract dates, notice dates, and so on... One thing that we want to use, and we haven't managed to use yet, we would like to do these analyses within teams, to understand if we have teams that have a higher number of hours of absences, or with a higher number of casualties. Since we are a factory, this ends up being an important indicator, which is the number of people who are on work-related illnesses. It's very much these metrics that we end up doing more of. The breakdown also by teams, by cost centers.
Interviewee A	CB\TA; CB\DM	We have difficulty in working with them because in the platform we have to select the data we want, i.e. the type of team, and everything else, but the platform itself doesn't give us anything, i.e. everything we do has to be in Excel.
Interviewee A	CB\KCS	within the team we only have one person who understands excel more deeply, and if that person is not there, we have no way to do the metrics, for example. Or, whenever I want to do a metric related to my responsibilities, for example, with the temporary workers, I always have to ask my colleague. The platform seems to be just data entry, and then you can extract the data, but you don't draw conclusions from that data, unless you're going to use excel.
Interviewee A	R\BR\INT	we have SAP for everything that is related to employees, to make warehouse reservations, and everything else, but then, for example, to manage production levels, it's another platform. In other words, we never get productivity data from there. Then, something stupid, we have SAP where we insert some things, but then SAP is connected to another platform, where the supervisors put the absences for example (the attendance management part is managed by another platform that integrates with SAP). Then, for example, we still have another one, where we put these analyses that we do, and there you can see a clearer report of the plant. But we have one platform, then the supervisors have another one to manage the production and their teams. Afterwards, all the productivity and personal goals that are done in the performance evaluation have nothing to do with each other. Some people use excel, others use another internal platform. This then ends up being a bit difficult. It's not even that it's difficult. It's much easier to lose data, or make mistakes with data along the way, compared to a system that does everything right away, isn't it...
Interviewee A	R\BR\INT	First, I think it's important to have everything about a person in one place.
Interviewee A	CB\KCS	But if you don't have training in excel, you can't do that cross-referencing, and it ends up taking a long time.
Interviewee A	CB\TA	Precisely because we are managing the performance evaluation in excel, I think this is already the fifth time that I'm redoing all the excel, because then all it takes is one bad filter, or some error, for everything to go wrong.
Interviewee A	CB\TA; R\U\G; R\BR\INT	Maybe if everything was in one platform, I could automatically see if I had my teams adapted to the production level or not. And we can't do that, because it's always in excel.
Interviewee A	R\NFR\FE	Additionally, I think that these platforms are not very intuitive. and I don't think that makes it easy either.
Interviewee A	PA\PAY	From my experience, what I see is that perhaps the data that is most labor intensive and requires the most care is Payroll Data, and all its variants. A platform that was good in this sense would be excellent.

Interviewee	Category (codes)	Outlined Text
Interviewee A	R\U\S; R\U\E; R\U\C	But then, we must send a list every month of the number of hours worked per person, if there were admissions in the health insurance of a certain person. If this information could all be added there, and calculation was done automatically, it was just a matter of checking. I can see that Payroll is not being worked on a regular basis throughout the month, it can't be done now.
Interviewee A	PA\TRA	Training metrics are always relevant. Now I don't know if companies are constantly analyzing.
Interviewee A	PA\TUR	I think that the retention part is also an important factor to be well analyzed. For example, a platform that can help you better analyze if a certain team has low retention, or if you already know that at a certain time of the year your retention is always low, for example. If you could do this kind of analysis, it would be interesting
Interviewee A	R\BR\EA	If the system itself would give us this information, and we could analyze it. And not the opposite. We constantly chase that data.
Interviewee B	CB\KCS	The HR Manager has a little bit of this difficulty in understanding numbers, rates, and it is important to understand how we can get to that data.
Interviewee B	CB\KCS	During the 5 years that I was involved in an HR department, I felt a lot of lack of training in this area.
Interviewee B	CB\TA	This kind of tool (HR Analytics)… we never used
Interviewee B	CB\KCS	I had a hard time understanding how we arrived at some data, to some results. For example, to understand what leads to a high turnover? Where I was, during these 5 years there was a high turnover, a very high rate. We never managed to stabilize. But okay, why couldn't we stabilize? Of course I had a general idea, but I never had concrete data to understand the high turnover rate.
Interviewee B	PA\TUR; R\BR\ROI	For example, I also never understood how long it takes to recruit a certain type of worker for a certain function. For example, for a furniture packer, or for carpentry. And also understand, on the other hand, the financial investment required for employees to reach an ideal level of satisfaction, productivity, performance, etc. That is, which employees are also more likely, or which areas are more likely to leave their jobs in the next 6, 12 months, or 2 years. We had the notion that the maximum stay in the company was between 2 years. But how can we measure this? We never had these tools. How can we predict the impact of personal development on our employees? I could never measure these parameters, among others.
Interviewee B	CB\TA	We never had these tools. How can we predict the impact of personal development on our employees? I could never measure these parameters, among others.
Interviewee B	CB\KCS	I didn't. Unfortunately I didn't. I come from another generation that didn't have that opportunity. It simply didn't happen. I didn't have that training. I have colleagues who have a lot of this contact with HR Analytics, and so I'm getting generic knowledge. But I myself didn't have that opportunity. I know a little bit. But in practice, I didn't have that opportunity.
Interviewee B	R\U\MK	understand some KPIs and other performance indicators.
Interviewee B	PA\ON	To understand data from employee onboarding
Interviewee B	PA\TUR	employee retention itself.

Interviewee	Category (codes)	Outlined Text
Interviewee B	PA\ATT	Also understand concrete data and numbers related to work attendance and absences. We had a lot of employees constantly putting in - 20 to 30 year old - constantly putting in sick leave
Interviewee B	CB\DM; R\BR\EA	A tool like this would allow us to collect, compare and contextualize this data. Because effectively it was all based on intuition and work. We couldn't measure or understand in concrete data the main indicators. I didn't have access to this data. And they were fundamental in a company of that size (large).
Interviewee B	PA\REC	I would love to see how much time we (recruiters) invest in hiring from A to Z. I used to hire for 15 brands within the group. And we wasted a lot of time on hiring, and then people would leave 2, 3, or 6 months later.
Interviewee B	PA\PAP; PA\TUR; PA\ATT	It would have been very interesting to understand which brands (and I could do it by my intuition as a recruiter), but I would like to understand and compare what is the best level of performance between one brand and another. Understand the level of turnover, the level of performance, the level of absenteeism, absences. For example, if one brand was more on time than another.
Interviewee B	PA\TRA	How often did they give training?
Interviewee B	PA\ENG	How many times did you meet with employees to understand their needs, their difficulties? The motivation to continue in one project or to change to another? It was important to understand why some stayed longer in a brand, compared to others. I think this would have been very interesting if we had, for example, HR Analytics on the table. And also evaluate this satisfaction on the part of some, and the non-satisfaction on the part of others.
Interviewee B	CB\MS; CB\TA	We worked a lot with excel, but in a very obsolete way. I was in a company that makes millions and so what I think is that although we put these kinds of ideas on the table, in meetings, this requires some investment. In the medium and long term. What I have noticed many times, not only at this level in the use of these types of tools, and other issues as well. To date, there hasn't been that openness.
Interviewee B	R\NFR\ACC; R\NFR\GDPR; R\NFR\SEC	To understand if there is no information leakage. GDPR compliance. All these confidentiality issues.
Interviewee B	CB\MS; R\BR\EA; CB\TA; R\BR\ROI	Because if on the one hand there are fortunately companies that implement this kind of software, there are many others that are still working in a very obsolete way. They don't want to invest, they don't want to waste time, they don't think it's necessary. They think that if it has always been a certain way, and if it has always worked, why should they change? And maybe they don't think about investing in this kind of software. I really felt this in my skin, and I also know other colleagues who also felt this a lot. Companies often don't want to waste time and don't want to invest. I find this surreal in this day and age. Because we need these tools, these software, to streamline processes, to leverage results, and to help us make measurements, collect data, to be able to analyze it, compare it, and understand how HR can help the company to have other results.
Interviewee C	PA\REC	we are 120 employees, and we don't do HR Analytics unless asked. And the only thing we evaluate are recruitment SLAs. And in my opinion they are not well evaluated, because they only count at the time the position opens, and at the time the position closes
Interviewee C	CB\TA	We don't have any software.

Interviewee	Category (codes)	Outlined Text
Interviewee C	CB\DM	We use all kinds of excel sheets, slides, google drive... This also makes our analysis difficult, and the analysis we do has few metrics...
Interviewee C	PA\ON	I now wonder how am I going to measure onboarding? How am I going to measure that I am doing good onboarding? Is it the number of onboarding I'm doing? No! But that's the number I currently have. I do 3 onboardings per month. I already know this. I don't want to know just this. I really want to know the learning of the employee, how many documents were opened, how many times the employee came to us for questions regarding the onboarding information that was shared in the 1st week.
Interviewee C	PA\PAY	The same in Payroll
Interviewee C	CB\KCS; CB\TA	But we are also all very junior, we have no tools to measure.
Interviewee C	R\BR\HRBP	There would be something that would be revolutionary in that, and that would turn what we do into numbers... Because all Management, and Middle-Management, only care about numbers. Obviously they want to know if the employees are doing well or not, but for them it's all about the numbers. And we at this moment, at least my company, can't translate what we do into numbers. That's why we are very much seen as support, and we don't fight with the same language (as other areas).
Interviewee C	CB\DM	Then we have one folder per employee, but then there are documents that go into another folder because they are related to occupational medicine. Then we have another folder that is just for IEFP, and IEFP we are not even going to talk about... It's really super disorganized.
Interviewee C	PA\PAP	And we were going to implement Sage more geared towards performance appraisal
Interviewee C	CB\KCS; CB\TA	And right now, until we have someone in charge of HR for the team, our founder doesn't want to move forward with it, and I totally understand because we have no experience with any program to say if it is good... So he is waiting for someone with more experience to say which program is good. However, we are spending a lot of time on these administrative processes.
Interviewee C	PA\REC; PA\TUR	Recruitment, Retention, and the disengagement process
Interviewee C	R\NFR\SEC	Security
Interviewee C	R\NFR\GDPR	I can't even take a penalty at the GDPR level,
Interviewee C	R\NFR\FE	Another thing, but this is super personal, I like fast software.
Interviewee D	R\BR\RT	I think the system should be able to pull real-time information from their existing systems
Interviewee D	R\NFR\FE	For sure it needs to be easy to use.
Interviewee D	R\U\CD; R\U\CC	(like dashboards or reports). But mainly, the development of these visualization tools
Interviewee D	R\BR\PRE	If it includes additional AI/ML components (Augmented analytics) that is a plus
Interviewee D	PA\DEM; PA\PAY; PA\REC; PA\TUR	I believe at first, they will be focused more on the core HR and Payroll data. Know their population, basic statistics, payment gaps, costs, turnover, etc.
Interviewee D	R\BR\PRE	with time, afterward, there should be a shift and they should realize that I have this powerful tool that can provide me better insights
Interviewee D	R\BR\HRBP	Not just pretty dashboards, but I can actually make changes. Better decisions to change core processes of development
Interviewee D	R\U\MK; R\U\CD	I believe they will more likely be keen into having dashboards that are easy to build, and be able to track metrics and KPIs

Interviewee	Category (codes)	Outlined Text
Interviewee D	R\U\CR	And the option for customizing Reports, which I think they have particular needs of the business, and it is important to have more than the standard reports that they have, based on their own needs and particular operations.
Interviewee D	R\BR\EA	Showing complex options can lead to user frustration while being over-simplistic can result in something they would be able to do in excel.
Interviewee D	R\BR\RT	But we should be able to have real-time info, up-to-date, and not have to wait for items or features to be generated or exported that are not done in a timely manner.
Interviewee D	R\U\E	features to be generated or exported
Interviewee D	PA\PAY	You have demand from suppliers and clients, even internal employees, especially with gender pay for example, social responsibility, or having more data to be inclusive and diverse.
Interviewee D	R\BR\INT	What we think that we can bring to the table, in this field, is integration. Integration will be a key component. Having a tool that they are familiar with, that users don't need to go to a secondary platform to get the information that they need. I think that will be a deal-breaker for most customers. If we can place the solution fully integrated with the existing modules, the buy-in will for sure increase, because you don't have to teach users again intensively.
Interviewee D	R\U\CR; R\U\CD	Additionally, the option to have these reports/dashboards be developed and created with/ by the Quidgest consulting team, which is deeply knowledgeable of the inputs available and potential of the existing solution, will also be valued.
Interviewee D	CB\KCS	And, as I mentioned before, due to the lack of knowledge from some HR teams, you also need more than the HR solutions you have (in this case Quidgest), but also the capacity to build those reports
Interviewee E	PA\REC	it was more for recruitment metrics.
Interviewee E	PA\TRA	Even in the training area.
Interviewee E	PA\WFP	But it is more in terms of how many employees we have, how many left, how many we forecast - and here I would use a little more predictive analytics - how many we forecast to start in 2/3 years. How many are expected to enter in X number of years. They also did that analysis.
Interviewee E	CB\MS; CB\TA; CB\KCS	Yes, none. But you have to think about the context (of one of the companies) that was manufacturing. Normally factory environment processes are not so digital. They use a lot of paper...
Interviewee E	CB\TA	So it's very Excel-based, and it doesn't go much beyond that. Everything beyond registration, there's no time either.
Interviewee E	CB\LT; CB\TA	one hasn't explored these tools, and also lack of time.
Interviewee E	CB\KCS	Simply if they had the knowledge of a tool that helps them analyze, and takes away most of the work they think they have to do, maybe there would be more adherence.
Interviewee E	R\BR\INT	it would be essential to have a system that I already use on a daily basis for other functions
Interviewee E	R\BR\EA	So, for me, I think this autonomy would be very important, because then I wouldn't need to be collecting data.
Interviewee E	R\U\NOT; R\U\G	Additionally, can it (the system) give me warnings and do analysis?
Interviewee E	PA\REC; PA\TRA	I think all areas are relevant, but I think effectively more time is invested in recruitment and training.
Interviewee E	PA\PAP	development, performance analysis, are usually one-offs. There are once or twice a year. Obviously it's good that there are also metrics, and analysis (of these practices),

Interviewee	Category (codes)	Outlined Text
Interviewee E	R\NFR\SEC	I think the security part is essential.
Interviewee E	R\NFR\GDPR	It is also important in a relatively recent aspect, a concern of HR, which has to do with the GDPR, and for example, we can have in our possession, people's CVs until X amount of time
Interviewee E	R\NFR\FE	And the speed. As I told you, we have little time.
Interviewee E	R\BR\INT	know of platforms that do data analytics just for recruiting. Where they also do the recruitment management part, and then they end up leveraging and doing the analytics. They do that multi-tasking. Not only do they manage and help manage the whole recruitment process, of sending emails, sending feedback, etc., but then they also do analytics. But it stops there. It doesn't move on to training, for example. And PowerBI you must select a database, and export, and then you analyze it. Not Quidgest. Quidgest can centralize everything, all the HR topics, and do the analysis in the system itself, with all the HR topics. So I think that's really where it's at. I think that is the main differentiator.
Interviewee F	R\NFR\FE; R\BR\INT; R\BR\EA	One that facilitates statistical analysis, does more advanced analysis without having to go to other software, without having to migrate data. For example, not having to go to SPSS. Sometimes people don't know what SPSS is either, so if a tool had those statistical components, user friendly, for those who don't have advanced statistical skills, I think it would be interesting.
Interviewee F	CB\KCS	Statistical skills, data analysis skills, yes. Not that the company doesn't have them. They may not be in HR to work on this data. Large companies we work with are already starting to have HR analytics areas of their own. But I wouldn't say it's very common. A generalist HR team, those skills may not be there
Interviewee F	R\BR\EA	That's why I was talking about the need for the tool itself to provide some quick support on that. And allow deeper analysis than averages or standard deviations.
Interviewee F	R\U\RE	Things like correlations, and seeing whether or not hypotheses have a statistical difference, is important.
Interviewee F	R\OT	Then one of the problems we see in companies is the integration of tools. That is, you have to have some way to integrate with very different tools. Through APIs, or some other way, but allowing you to get data from Successfactors, for example. Go to the various tools that companies have...
Interviewee F	CB\TA	I feel like a lot of times they (organizations) are tied to one system because they've already made a big investment in it. If it wasn't for a monetary issue, they would have many more tools and focus on certain points. For example, a certain base tool, they bought the whole package, but for that specific policy it doesn't suit them. Or they want to have a model that the requirements of the tool itself don't allow. Very simple things like setting individual objectives, and the tool only allows for collective objectives, for example. But then they don't change their own model because of the tool, they already know they can't have another one...
Interviewee F	R\OT	The tendency is more and more to atomize the tools, that is, to choose the proper tool that we want, and then integrate them all. But yes, many companies are held hostage by one system.
Interviewee F	CB\KCS; R\BR\EA	And also, having that ease to have a certain level of automation, that by changing the database, it will fetch without many configurations of the connections. Many times, that knowledge is in one person, who developed (the tool), and employees in companies go away, and then that mess is left. Like excel's, basically. The formulas are linked, and that person knew, but then the person leaves, or changes department, and nothing is recorded of how those links were made. And this Analytics tool (that we are developing at Quidgest) would be basically an excel "on steroids".

Interviewee	Category (codes)	Outlined Text
Interviewee F	R\U\RE	Statistical models. If you already had there (in the Analytics tool) layouts and templates with the main rules for the person to understand if that is the test (of hypotheses), for example, that the person wants to do or not. I think it would help a lot. Maybe even tutorials, to know if the test you are doing makes sense or not. If the hypotheses are the right ones for that test or not
Interviewee F	R\U\CR; R\U\CC; R\U\CD	Then, I think the report generation itself should be modeled. There shouldn't be a standard report. The need to report to one of the directors is different from your manager, or the manager below, for the team to see. And to have that speed of building a report, and getting multiple reports out at the same time. Which sometimes is not easy in the tools that we have seen.
Interviewee F	R\U\GA	o have pre-defined questions where the person basically fills in the fields, and that generates an automatic answer. Ask what data the user has to impute, and give you an answer. Instead of leaving an open field, like in excel, a blank page for the person to build everything, there they already had templates saying "here you put the list of employees, here you put how much they earn, here you put this and that...", and at the end you give the user the answer. Having that architecture already predefined I think will also help a lot of people. The architecture of how they are going to do it also limits a lot of people's willingness to do it. With those predefined I think it would already help a lot of people.
Interviewee F	CB\TA	Of HR Analytics in specific, I don't think so, but I also never had contact in practice. I sometimes hear that it is difficult because of the issue we were talking about earlier, because they bought the whole package, and then they can't get much out of it. But I don't think I have much insight in this area.
Interviewee F	PA\PAP; PA\PAY	at least are the most fundamental, which are the ones that people value most, and that you need to have data for reporting to executive committees, and for justifying decisions. One has to do with compensation, and compensation next to performance
Interviewee F	R\U\RE	And then getting correlations from there.
Interviewee F	PA\DI	And also one thing that companies talk a lot about now, which is non-discrimination, diversity and inclusion, these issues.
Interviewee F	R\U\BN	I would also add to the previous question (of features) the benchmarking, because companies like to compare themselves very much with other companies. Even if you give them a certain architecture to answer a certain problem, and give them a result, then they always run out of... "Is this good, is this bad? How are others in relation to this?"
Interviewee G	CB\TA	We do it in a very artisanal way. We use Excel to do our analysis, and therefore we have some automated processes in the sense that we structured the information in a certain way. We have the maps/charts that we use automated and parameterized having automated and parameterized having the information in a certain support and structure, we have what are our dashboards (in quotation marks), which go to that repository and give retrieve data from that repository and give us the information automatically. And we have situation where we have to do ad doc analysis, and we have to work the data in a different in a different way. But usually the concern is to structure it and then do the analysis. Then do the analysis.

Interviewee	Category (codes)	Outlined Text
Interviewee G	R\U\CR; R\U\CC; R\U\CD	And we already have prepared our templates that will analyze this information in this way. If I put the data in there, then I can play with the parameters on a different sheet and I have the charts that I need, or the graphs that I need. Basically, although in a handmade way, this is what a tool of this kind also provides us. We put the data into a certain structure, and then we have a set of charts, or views, that we can parameterize, to do this analysis.
Interviewee G	R\BR\EA; R\BR\INT	Ideally, we would also like to do without the part of the plumbing. This thing of having to take the data from one side, then work on it, and then do the ETL part manually... we want to do it without that process, and have this integrated in one place. The place where the data is, which is the information system. So if the data is in the information system, and the ETL is automated, and the analysis dashboards and the charts and everything else all available, our concern becomes, on the one hand, quality at the source, and it's our origin, and it is our colleagues in HR who do the data processing and filling in the data, and on the other hand, it's at the end, which is looking at the data interpreting the data, and validating the quality of the data at that level. And forego this middle part which is the most boring and least interesting, and most labor-intensive. If we can have software tools that do that for us, that's what we want.
Interviewee G	PA\DEM; PA\TRA	Our main analysis has to do with the control of the workforce, and the characteristics of the workforce. The monitoring of that. How many HR we have, typologies, analysis of distribution by gender, by age, categories, careers, by origin qualifications, training areas.
Interviewee G	PA\PAY	Therefore, we have mainly worked on the headcount and FTE data in a descriptive way, therefore describing the characteristics of our population. Also our wage bill, so, what are the expenses with HR, considering these various segregations. The control of this over time
Interviewee G	R\U\CV	It should also be in the scope of the different levels of the organization. I mean, in the different services, according to the needs of each one, people should have access to this information that they need to do their work and be able to do their work better.
Interviewee G	PA\ATT; R\U\S; R\U\CD; PA\TRA	I think my HR colleagues might be interested in presenting dashboards about attendance, the training they do every year
Interviewee G	R\U\CR	We would like to have the ability to export lists more easily. I'm saying this but it's not my priority, that lists we can already export. I'm just trying to say this in a chained way. Lists that allow us to validate the information. Because I can't validate the information only in aggregate terms. There I can understand some trends, I can have some intuition of what is good or bad, but if the errors are marginal, I won't understand anything.
Interviewee G	R\U\CR	For example, being able to calculate percentages, being able to calculate sums
Interviewee G	R\BR\PRE	Eventually, the predictive issue may be pertinent further down the line,
Interviewee G	R\U\CD; R\U\S; R\U\CC	And maybe I should have said this first, but we need graphic representations. To have the charts, but to have the graphical representations so that we can easily create online dashboards that we can make available to management, and for them to consult at any time.

Interviewee	Category (codes)	Outlined Text
Interviewee G	R\BR\SO	Ideally, it would be good to sign off on the information. Saying "this report is okay, we have validated the information, and we can make it available to our information consumers. And have it available on a certain site, with refresh at times that we think are pertinent. Not having people freely go and look at the data. We also want to filter a little bit, because I think we don't have enough maturity in terms of information management that allows us to deliver to top management all the information that comes out of the system without prior validation. So, I think it was important to have this filter, that when we want the data to go through, and as long as we don't have confidence, we close the access until we have that confidence. As soon as we manage to install procedures in the institution (more procedures than already exist), we can move on to real-time, the dean goes to a site, and sees the data he wants to see, and makes his queries, and filters, and drill-downs of this hierarchy. And he sees everything he wants to see.
Interviewee G	R\U\S	Saying "this report is okay, we have validated the information, and we can make it available to our information consumers. And have it available on a certain site, with refresh at times that we think are pertinent. Not having people freely go and look at the data. We also want to filter a little bit, because I think we don't have enough maturity in terms of information management that allows us to deliver to top management all the information that comes out of the system without prior validation
Interviewee G	R\U\S	No no, on a separate site. Of course, it has some kind of authentication, that we don't want the data in public. Even the dean himself has an authentication. It doesn't matter if it's inside the system or not. For the dean I think it works better to have a bookmark link there and enter. But if he has to go through the entry portal of the system, and the modules that appear to him is just this HR Analytics module, that's it, he logs in. I think he would enjoy having that. And it would probably be indifferent whether it's a separate site, or whether it's within the system. I think functionally speaking, what makes more sense is to be inside the system so that everything is integrated and to take advantage of the solutions that are already in the system in terms of authentication
Interviewee G	R\NFR\ACC	Of course, it has some kind of authentication, that we don't want the data in public. Even the director himself has an authentication.
Interviewee G	R\NFR\ACC	Exactly. In fact, it would be important to have profiles of what data each person has access to. Because we can have people from HR who will have access to certain data, and people from the Planning Division who will have access to that data and other data, and we have the Director who will only want the dashboards to be able to do monitoring over time.
Interviewee G	R\NFR\GDPR; R\NFR\SEC	Security is unavoidable. If the system presents only aggregated data, although security is important, it lowers the level of concern. If the system can present lists with people identification, security is a big concern, because we have the GDPR.
Interviewee G	R\BR\EA	Usability is very important, people always want - especially this type of users - to be able to log in, see what they need to see, and not have a big hassle. Not even sometimes understanding much of the data model to be able to have the data. But sometimes we can simplify that
Interviewee G	R\U\CR	On one hand we can have the flexibility that people can build their own reports, but we can also have it for users who don't want to build their own reports but want to see the same thing over and over again, and don't need to drill down on the data. We can have the reports pre-configured and they see what is already set up. And so, doing that in a practical, available way...

Interviewee	Category (codes)	Outlined Text
Interviewee G	R\BR\SO	In terms of time availability of the data, I wouldn't make a point of having the data in real time. Although maybe for some users it would be pertinent not to be looking at obsolete data when they are doing validations, not to be running after "ghosts" and not wasting time validating data that today is already fine. But for those who need to consult the information, this HR reality doesn't necessarily imply that they need to know how many people are in office per day. Or that you need to know more recent data, like attendance or expense processing, there are timings in which this happens. Maybe I'm not interested in seeing attendance in the middle of the month, I'm only interested in seeing it at the end of the month. So I don't need to have it by the day
Interviewee G	R\U\CR; R\U\CC; R\U\CD	Quite frankly, if we have access to export detail data, and have charts and dashboards, which is the "bread and butter", but that's what we urgently need, it would save us so much workload,
Interviewee G	R\NFR\SEC	that if we get what are the other basic security requirements
Interviewee G	R\NFR\FE; R\BR\EA	Having this, something that works, and in the terms that we are asking for, that is efficient, that is fast, or even if it is a little bit slow, it would already be more flexible and available than what we currently have, and save us some ETL work, is what we would want. I wouldn't say we would be extremely satisfied, but I would say we would be quite a bit better off than what we currently have.
Interviewee H	R\BR\PRE	For the first part of what is descriptive statistics, I think there is already a lot on offer. You can use that (new HR Analytics solution) for a cross selling of the clients that are already there now, and leverage some client to design that part, to sell to client, and to use that as a product for sale. Now, I tell you, the market is highly saturated with regard to these Analytics solutions
Interviewee H	R\U\RE	In theory, since it has to be fit for all, it has to be a simple model, such as regression
Interviewee H	R\BR\PRE	I think the data organization part is always useful, and there is already some supply. I think you (Quidgest) would gain more by going in right away with predictive and optimization models. That's what customers want. HR, unfortunately, is always late for everything. Marketing, finance, they have been using forecasts and analytics, and predictive models for a long time. Before Human Resources was even called Human Resources.
Interviewee H	R\U\CD; R\U\CC	But for example, if Quidgest wants to focus only on descriptive statistics, and working on the data, and metrics, I think you should focus more as a competitive advantage on what visualization is. That's what people want. We have a very lazy eye. There are good platforms and there are bad platforms. What differentiates good and bad is how the data is explained and visualized. I think this part can differentiate you guys.
Interviewee H	R\BR\PRE; R\U\CC; R\U\CD	We already have the ERPs that have a lot of things, and I think this part is important, and they can do it, but Quidgest should take into account, as a competitive advantage, what is the data visualization, and then take the next step to predictive models and optimization.
Interviewee H	CB\KCS	I think 80% to 90% of the companies in Portugal don't use HR Analytics. And they don't even know it.
Interviewee H	CB\KCS	There are people who are good at HR models, and there are people who are only focused on what is Analytics, Business Intelligence, and so on. Unlike other areas, in my view, you have to put the two together. In my opinion, there is no critical mass of knowledge in Portugal at the HR level.

Interviewee	Category (codes)	Outlined Text
Interviewee H	CB\MS	but in fact about pure and hard HR knowledge, I think we are not autonomous enough, because we are dependent on corporate headquarters that are in Spain or in France, that is, that are not here in Portugal, so we are a mere geography, and we don't exactly have autonomy for these projects.
Interviewee H	CB\KCS	Regarding the first point, I think we are bad at HR, bad at People Analytics, and I think we are still far behind in terms of technical knowledge.
Interviewee H	CB\KCS, CB\DM, CB\TA	Regarding the lack of technology, I think you have very good systems for very good companies with a lot of money. And then you have “lost excel sheets” for what are medium-sized companies with absolutely terrible data. This goes toward the 3rd point. I recently finished a People Analytics project, where I had to clean the base data, and for each exit, the HR technician in question deleted certain items from the person who left, so as not to be counted in the excel, in the Vlookups, in the sumifs, so as not to be counted in the current headcount. The decision of this person, who mishandled the data, had huge impacts, because there was data that was simply lost. This in a company of almost 200 people. It's strange how there isn't even a basic tidying up of the data. There is a huge lack of knowledge, a lot of disorganization, planning and ad hoc management. I absolutely agree.
Interviewee H	PA\REC; PA\ON	I think you should look at what the employee life cycle is. Recruitment, then you have onboarding, which is typically managed with internal communication, or with what are pole surveys. buddies programs, etc. and that's all data that can be on a dashboard
Interviewee H	PA\PAP; PA\TRA	And then of course, everything that is upskilling and reskilling, the development of people, which is very much based on the performance evaluation that also generates data, which I think should be included here.
Interviewee H	PA\DEM; PA\TUR; PA\PAY; R\U\C	traditional HR metrics, Headcount, salaries, Education, age, gender, geography, job name, team, functional group (very important), costs, average and total sum of costs, percentage weight of costs, percentage weight of salaries against revenue, admissions, turnover by date, cumulative turnover, in percentage, seniority, then an organization tree. People costs based on revenue, something important. Very similar to something you guys are looking to do at Quidgest, which is really looking at that first part of descriptive statistics, metrics, etc., and I think those are the first areas. Always looking at this common data that we are used to seeing and working on.

Appendix B

Questionnaire - English Version

HR Analytics Survey

Hello!

I'm Miguel Gaspar, and I'm contributing to build the foundations of a brand new HR Analytics Solution at my company, Quidgest, within the scope of my Final Project of my Master's Degree in HR and Organizational Consultancy, at ISCTE.

Quidgest already possesses a wide range of HR Information Systems Solutions (Payroll, Recruitment, Training, Performance Appraisal, among others), and we are aiming to create a new Solution related with HR Analytics.

We are gathering insights from CEOs/Administrators/Managers and HR-related personnel on HR Analytics, through different methods (Interviews, Focus Groups, etc.), so that we can better understand how this new product can be relevant to potential clients.

This survey is a good chance for you to be part of it!

The survey is anonymous, and besides the demographical questions, it is composed of 7 multiple choice questions, and 3 paragraph questions. In total, the survey should take you about 5-10 minutes to answer.

Questions marked with an asterisk (*) are required.

In the last section of the Survey you may find the references used in some of the questions.

If you want to have a deeper participation about the topic, please, schedule a 30-minute meeting with me, at https://calendly.com/miguelfagaspar/30min

Thank you!

* Required

Demographics and your Organization

This section is aimed to understand the profile of our responders, and the Organization you represent.

* Required

Demographics and your Organization

This section is aimed to understand the profile of our responders, and the Organization you represent.

1. What is your role at your company? *

Mark only one oval.

- ◯ CEO
- ◯ HR Director | CHRO
- ◯ HR Specialist | Generalist | Supervisor
- ◯ HR Analyst | Administrator | Representative | Associate | Assistant | Recruiter
- ◯ Other: _____

2. If you work in any specific area of HR (such as Recruitment, Payroll, Training, Labor Law, or others), indicate in which one.

_____

_____

_____

_____

_____

3. For how long do you work in HR? *

Mark only one oval.

- ◯ <1 Year
- ◯ 1-2 years
- ◯ 3-5 years
- ◯ 5-10 years
- ◯ >10 years
- ◯ I don't have direct experience working with HR

4. Gender *

Mark only one oval.

- ◯ Female
- ◯ Male
- ◯ Prefer not to say
- ◯ Other: _____

5. Age *

Mark only one oval.

- ◯ 18-29
- ◯ 30-39
- ◯ 40-49
- ◯ 50-59
- ◯ >60

6. Education *

Mark only one oval.

- ◯ Middle School
- ◯ High School
- ◯ Bachelor's Degree (BSc)
- ◯ Post-Graduation
- ◯ Master's Degree (MSc)
- ◯ Doctorate (PhD)
- ◯ Other: _____

7. What is your Academic Background?

_____

8. Does your organization operate in Portugal? *

Mark only one oval.

- ◯ Yes
- ◯ No

9. Is your organization in the private or public sector? *

Mark only one oval.

- ◯ Private Sector
- ◯ Public Sector
- ◯ Other: _____

10. How many employees does your company have? *

Mark only one oval.

- ◯ Up to 10 employees
- ◯ From 11 to 50 employees
- ◯ From 51 to 250
- ◯ More than 251 Employees

11. What is your business' annual volume in revenue? *

Mark only one oval.

- ◯ Less than 2 million Euros
- ◯ From 2 to 10 Million Euros
- ◯ From 10 to 50 Million Euros
- ◯ Above 50 Million Euros

12. Are you a Quidgest's client? *

Mark only one oval.

- ◯ Yes
- ◯ No

13. If you would like to have a more active participation in this process, insert your contacts (e-mail and/or phone number) so that we can have a deeper conversation on the subject.

_____

HR Analytics features you would like to have

In this section, contribute with ideas/features you think are relevant for an HR Analytics Solution.

Definition of HR Analytics:
"HR practice enabled by information technology that uses descriptive, visual, and statistical analyses of data related to HR processes, human capital, organizational performance, and external economic benchmarks to establish business impact and enable data-driven decision-making" (Marler and Boudreau, 2017).

14. When acquiring an HR Information System, how important is it for you to have an Analytics function, such as the ability to visualize dashboards, calculate metrics, reporting services, among others? *

Mark only one oval.

	1	2	3	4	5	
Not important	◯	◯	◯	◯	◯	Very Important

15. What are the main features of the systems you would value the most in an HR Analytics Solution? Please, identify to the utmost 3 critical features *

16. What would be your main concerns as a User/Manager/Administrator of an HR Analytics Solution? (in terms of Performance, Security, Capacity, and Reliability) *

17. If you already use a tool that catalyzes HR Analytics, what are the main features you use? *

18. Which HR Analytics methods do you believe you would use the most or value the most when acquiring an HR Information System? (Select Up to 3) - Van hulpen, 2019 *

Check all that apply.

- [ ] Benchmarking
- [ ] Correlation Analysis
- [ ] Customize Reports
- [ ] Dashboards that are easy to build
- [ ] Regression Analysis
- [ ] Social Network Analysis
- [ ] Track Metrics and KPIs
- [ ] I am not sure
- [ ] Other: _____

19. Which HR Practices would you value the most in an HR Analytics Solution? (Select up to 3) - Tursunbayeva, 2018 *

Check all that apply.

- [ ] Attendance
- [ ] Compensation and Benefits
- [ ] Churn and Retention
- [ ] Diversity and Inclusion
- [ ] Engagement
- [ ] Performance Appraisal
- [ ] Recruitment and Selection
- [ ] Training
- [ ] Wellness, Health, and Safety
- [ ] Workforce Planning
- [ ] I am not sure
- [ ] Other: _____

HR Analytics in your Organization

Tell us how your organization is using HR Analytics processes, and which HR practices are you trying to improve through data.

20. Which type of data does your Organization proactively collects about its employees? - Chalutz Ben-Gal, 2019; Ekka, 2021; Isson & Harriott, 2016; Khan & Tang, 2016; King, 2016 *

Check all that apply.

- [ ] General Employee Records (Personal Data and functional data)
- [ ] Compensation and Benefits
- [ ] Employee Experience and Wellbeing
- [ ] Engagement
- [ ] Learning & Development
- [ ] Performance Appraisal
- [ ] Turnover
- [ ] Recruitment and Selection Process
- [ ] I am not sure
- [ ] Other: _____

21. Which HR practices does your organization actively seeks to improve through HR Analytics? *

Check all that apply.

- [ ] Compensation and Benefits
- [ ] Employee Experience and Wellbeing
- [ ] Engagement
- [ ] Learning & Development
- [ ] Performance Appraisal
- [ ] Predict Turnover
- [ ] Recruitment and Selection Process
- [ ] Workforce Planning
- [ ] We don't perform HR Analytics
- [ ] I am not sure
- [ ] Other: _____

22. What is the major obstacle for a better HR Analytics processes' implementation in your organization? - Fernandez & Gallardo-Gallardo (2020) *

Mark only one oval.

- ◯ Lack HR Data Management
- ◯ Suitable Software and Technology available to perform HR Analytics
- ◯ Insufficient skills, knowledge and competencies of HR professionals related with Analytics
- ◯ Management Buy-in and Interest in HR Analytics

23. What is the second major major obstacle for a better HR Analytics processes' implementation in your organization? - Fernandez & Gallardo-Gallardo (2020) *

Mark only one oval.

- ◯ Lack HR Data Management
- ◯ Suitable Software and Technology available to perform HR Analytics
- ◯ Insufficient skills, knowledge and competencies of HR professionals related with Analytics
- ◯ Management Buy-in and Interest in HR Analytics

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Appendix C

Questionnaire – Portuguese Version

Questionário HR Analytics

Olá!

Chamo-me Miguel Gaspar e estou a contribuir para construir as bases de uma nova Solução de HR Analytics na empresa onde trabalho, a Quidgest, no âmbito do meu Projeto Final de Mestrado em RH e Consultoria Organizacional, no ISCTE.

A Quidgest já possui uma vasta gama de Soluções de Sistemas de Informação de RH (Processamento Salarial, Recrutamento, Formação, Avaliação de Desempenho, entre outros), e pretendemos criar uma nova Solução relacionada com HR Analytics.

Estamos a recolher as opiniões de CEOs/Administradores/Gestores e profissionais ligados a RH sobre HR Analytics, por meio de diferentes métodos (Entrevistas, Focus Groups, etc.), para que possamos entender melhor como este novo produto pode ser relevante para os nossos clientes, e para potenciais novos clientes.

Esta pesquisa é uma boa oportunidade para fazer parte deste estudo!

A pesquisa é anónima e, além das questões demográficas, é composta por 7 questões de escolha múltipla e 3 questões de desenvolvimento. No total, o questionário deve levar cerca de 5 a 10 minutos a responder.

As perguntas marcadas com um asterisco (*) são obrigatórias.

Na última seção do questionário, poderá encontrar as referências usadas em algumas das questões.

Se desejar ter uma participação mais aprofundada sobre o assunto, por favor, agende uma reunião de 30 minutos comigo, em https://calendly.com/miguelfagaspar/30min

Obrigado!

Questões Demográficas | A Sua Organização

Esta seção tem como objetivo entender o perfil dos nossos participantes e da Organização que representam.

1. Qual é o seu papel na sua empresa? *

Mark only one oval.

- ( ) CEO
- ( ) Diretor/a de RH | CHRO
- ( ) HR Specialist | Generalist | Supervisor
- ( ) HR Analyst | Administrator | Representative | Associate | Assistant | Recruiter
- ( ) Other: _____

2. Se trabalha em alguma área específica de RH (Recrutamento, Processamento Salarial, Formação, ou outra), indique-nos qual.

_____

_____

_____

_____

_____

3. Anos de Experiência em RH *

Mark only one oval.

- ( ) <1 Ano
- ( ) 1-2 Anos
- ( ) 3-5 Anos
- ( ) 5-10 Anos
- ( ) >10 Ano
- ( ) Não tenho experiência direta a trabalhar em RH

4. Género *

Mark only one oval.

- ◯ Feminino
- ◯ Masculino
- ◯ Prefiro não dizer
- ◯ Other: _____

5. Idade *

Mark only one oval.

- ◯ 18-29
- ◯ 30-39
- ◯ 40-49
- ◯ 50-59
- ◯ >60

6. Habilitações Literárias *

Mark only one oval.

- ◯ Ensino Básico
- ◯ Ensino Secundário
- ◯ Licenciatura
- ◯ Pós-Graduação
- ◯ Mestrado
- ◯ Doutoramento
- ◯ Other: _____

7. Qual é a sua formação académica? (Curso, especialização)

_____

8. A sua organização opera em Portugal? *

Mark only one oval.

- Sim
- Não

9. A sua organização opera no setor privado ou público? *

Mark only one oval.

- Private Sector
- Public Sector
- Other: _____

10. Quantas pessoas emprega a sua organização? *

Mark only one oval.

- Até 10 empregados
- De 11 a 50 empregados
- De 51 a 250 empregados
- Mais de 251 empregados

11. Qual é o volume anual de negócios da sua organização? *

Mark only one oval.

- Menos de 2 milhões de euros
- De 2 a 10 milhões de euros
- De 10 a 50 milhões de euros
- Mais de 50 milhões de euros

12. É um cliente da Quidgest? *

Mark only one oval.

- ◯ Sim
- ◯ Não

13. Se gostaria de ter uma participação mais ativa neste processo, insira os seus contatos (e-mail e/ou telefone).

_____

Funcionalidades que gostaria de ter numa solução de HR Analytics

Nesta secção, contribua com ideias/funcionalidades que considera relevantes para uma solução de HR Analytics

Definição de Análise de RH:
"Prática de RH assente em tecnologias de informação que usa análises descritivas, visuais e estatísticas de dados relacionados a processos de RH, capital humano, desempenho organizacional e benchmarks económicos externos para estabelecer o impacto nos negócios e permitir a tomada de decisão baseada em dados" (Marler e Boudreau . 2017).

14. Ao adquirir um Sistema de Informação de RH, qual a importância que atribuiria a funcionalidades de Analytics, como a capacidade de visualizar dashboards, calcular métricas, gerar relatórios, entre outros recursos? *

Mark only one oval.

	1	2	3	4	5	
Nada Importante	◯	◯	◯	◯	◯	Muito Importante

15. Quais são as principais características que mais valorizaria numa solução de HR Analytics? Por favor, identifique até 3 características. *

_____

_____

_____

_____

_____

16. Quais seriam as suas principais preocupações como utilizador/gestor/administrador de uma solução de HR Analytics? (em termos de desempenho, segurança, capacidade e confiabilidade) *

17. Se já utiliza uma ferramenta de HR Analytics, quais são as principais funcionalidades que mais utiliza e valoriza?

18. Que métodos de HR Analytics considera que mais usaria ou valorizaria, ao adquirir um Sistema de Informação de RH? (Selecione até 3) - Van Hulpen, 2019 *

Check all that apply.

- [ ] Benchmarking
- [ ] Análises correlacionais
- [ ] Regressão Linear
- [ ] Análise de Redes Sociais (de trabalho)
- [ ] Criar Dashboards de forma fácil
- [ ] Monitorizar métricas e KPIs
- [ ] Personalizar Relatórios
- [ ] Não tenho a certeza
- [ ] Other: _____

19. Que práticas de RH mais valorizaria numa solução de HR Analytics? (Selecione até 3) - Tursunbayeva, 2018 *

Check all that apply.

- [ ] Assiduidade
- [ ] Compensação e Benefícios
- [ ] Retenção
- [ ] Inclusão e Diversidade
- [ ] Engagement
- [ ] Avaliação de Desempenho
- [ ] Recrutamento e Seleção
- [ ] Formação
- [ ] Segurança e Saúde no Trabalho
- [ ] Workforce Planning
- [ ] Não tenho a certeza
- [ ] Other: _____

HR Analytics na sua Organização

Conte-nos como a sua organização está a usar processos de HR Analytics e que práticas de RH está a tentar melhorar por meio de análise de dados.

20. Que tipo de dados a sua Organização recolhe de forma proativa sobre os seus funcionários? - Chalutz Ben-Gal, 2019; Ekka, 2021; Isson e Harriott, 2016; Khan e Tang, 2016; King, 2016 *

Check all that apply.

- [ ] Dados Pessoais
- [ ] Compensação e Benefícios
- [ ] Bem-estar e satisfação do trabalhador
- [ ] Engagement
- [ ] Formação e Desenvolvimento
- [ ] Avaliação de Desempenho
- [ ] Turnover
- [ ] Recrutamento e Seleção
- [ ] Não tenho a certeza
- [ ] Other: _____

21. Que práticas de RH a sua organização procura ativamente melhorar por via de HR Analytics? *

Check all that apply.

- [ ] Compensação e Benefícios
- [ ] Bem-estar e Satisfação do consumidor
- [ ] Engagement
- [ ] Formação e Desenvolvimento
- [ ] Avaliação de Desempenho
- [ ] Retenção
- [ ] Recrutamento e Seleção
- [ ] Workforce Planning
- [ ] Não usamos HR Analytics
- [ ] Não tenho a certeza
- [ ] Other: _____

22. Qual é o principal obstáculo para uma melhor implementação dos processos de HR Analytics na sua organização? - Fernandez & Gallardo-Gallardo (2020) *

Mark only one oval.

- ◯ Má Gestão de Dados dos Recursos Humanos
- ◯ Software e tecnologia adequados para realizar HR Analytics
- ◯ Conhecimento e competências insuficientes dos profissionais de RH relacionados com Analytics
- ◯ Falta de Adesão e Interesse da Gestão em HR Analytics

23. Qual é o segundo principal obstáculo para uma melhor implementação dos processos de HR Analytics na sua organização? - Fernandez & Gallardo-Gallardo (2020) *

Mark only one oval.

- ◯ Má Gestão de Dados dos Recursos Humanos
- ◯ Software e tecnologia adequados para realizar HR Analytics
- ◯ Conhecimento e competências insuficientes dos profissionais de RH relacionados com Analytics
- ◯ Falta de Adesão e Interesse da Gestão em HR Analytics

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Appendix D

Characterization of the Questionnaire sample

Table D.1: Roles

Role at your company	**Absolute Frequency**	**Relative Frequency**
HR Specialist | Generalist | Supervisor	43	36,13%
HR Analyst | Administrator | Representative | Associate | Assistant | Recruiter	41	34,45%
HR Director | CHRO	19	15,97%
CEO	6	5,04%
C-level	2	1,68%
Corporate Ombudsman Knowledge & Analytics Manager	1	0,84%
Head of Business Intelligence	1	0,84%
HR IT Consultant	1	0,84%
HR Reporting & Analytics Manager	1	0,84%
Data Scientist	1	0,84%
Trainee in Community Engagement	1	0,84%
Consultant	1	0,84%
HR External Consultant	1	0,84%
Total	**119**	**100,00%**

Table D.2: Years of Experience in HR

Years of Experience in HR	Absolute Frequency	Relative Frequency
>10 Year	**35**	**29,41%**
CEO	4	3,36%
HR Analyst | Administrator | Representative | Associate | Assistant | Recruiter	2	1,68%
HR Director | CHRO	12	10,08%
HR External Consultant	1	0,84%
HR Specialist | Generalist | Supervisor	16	13,45%
5-10 Years	**29**	**24,37%**
CEO	2	1,68%
Corporate Ombudsman Knowledge & Analytics Manager	1	0,84%
HR Analyst | Administrator | Representative | Associate | Assistant | Recruiter	5	4,20%
HR Director | CHRO	4	3,36%
HR IT Consultant	1	0,84%
HR Reporting & Analytics Manager	1	0,84%
HR Specialist | Generalist | Supervisor	15	12,61%
1-2 Years	**25**	**21,01%**
Consultor	1	0,84%
Head of Business Intelligence	1	0,84%
HR Analyst | Administrator | Representative | Associate | Assistant | Recruiter	20	16,81%
HR Specialist | Generalist | Supervisor	3	2,52%
3-5 Years	**22**	**18,49%**
HR Analyst | Administrator | Representative | Associate | Assistant | Recruiter	10	8,40%
HR Director | CHRO	3	2,52%
HR Specialist | Generalist | Supervisor	9	7,56%
<1 Year	**6**	**5,04%**
Data Scientist	1	0,84%
HR Analyst | Administrator | Representative | Associate | Assistant | Recruiter	4	3,36%
Trainee in Community Engagement	1	0,84%
I don't have direct experience working with HR	**2**	**1,68%**
C-level	2	1,68%
Total	**119**	**100,00%**

Table D.3: Gender

Gender	Absolute Frequency	Relative Frequency
Female	86	72,27%
Male	33	27,73%
I prefer not to say		0,00%
Total	**119**	**100,00%**

Table D.4: Age

Age	Absolute Frequency	Relative Frequency
18-29	49	41,18%
30-39	40	33,61%
40-49	22	18,49%
50-59	8	6,72%
Total	**119**	**100,00%**

Table D.5: Education Level

Education Level	Absolute Frequency	Relative Frequency
Bachelor's Degree	35	29,41%
High School	1	0,84%
Master's Degree	55	46,22%
Post-Graduation	28	23,53%
Total	**119**	**100,00%**

Table D.6: Academic Background

Academic Background	Absolute Frequency	Relative Frequency
Human Resources Management	50	42,02%
Organizational Psychology	20	16,81%
Business Management	10	8,40%
Psychology	9	7,56%
Sociology	4	3,36%
(in blank)	3	2,52%
Marketing and Advertising	2	1,68%
Clinic Psychology	2	1,68%
Economy	2	1,68%
Management and Industrial Engineering	1	0,84%
Data Processing Technician	1	0,84%
Modern and Contemporary History	1	0,84%
Information Management Systems	1	0,84%
Education	1	0,84%
Social Sciences	1	0,84%
Human Resources & Information Systems	1	0,84%
Engineer	1	0,84%
Commercial Banking and Insurance	1	0,84%
Public Relation and Advertising	1	0,84%
Psychology of Deviant Behaviour and Justice	1	0,84%
Law	1	0,84%
Bachelor’s in Management, Master’s in Data Science	1	0,84%
Languages and Literature	1	0,84%
International Relations	1	0,84%
Accountancy	1	0,84%
IT	1	0,84%
Total	**116**	**100,00%**

Table D.7: Number of employees

Number of employees	Absolute Frequency	Relative Frequency
Over 251 employees	76	63,87%
From 51 to 250 employees	27	22,69%
From 11 to 50 employees	12	10,08%
Up to 10 employees	4	3,36%
Total	**119**	**100,00%**

Table D.8: Annual Business Revenue

Business Volume	Absolute Frequency	Relative Frequency
Above 50 Million Euros	54	45,38%
From 10 to 50 Million Euros	26	21,85%
From 2 to 10 Million Euros	22	18,49%
Less than 2 Million Euros	17	14,29%
Total	**119**	**100,00%**

Table D.9: Are you a Quidgest client?

Are you a Quidgest Client?	Absolute Frequency	Relative Frequency
No	115	96,64%
Yes	4	3,36%
Total Geral	**119**	**100,00%**

Table D.10: Private or Public Sector

Private or Public Sector	Absolute Frequency	Relative Frequency
Private Sector	106	89,08%
Public Sector	7	5,88%
Both	5	4,20%
IPSS	1	0,84%
Total	**119**	**100,00%**

Appendix E

Questionnaire Results

Table E.1: Frequency of the answers to the multiple-choice question "When acquiring an HR Information System, how important is it for you to have an Analytics function, such as the ability to visualize dashboards, calculate metrics, reporting services, among others?"

Scale 1 – Not important 5- Very importante	Absolute Frequency	Relative Frequency
5	87	73,11%
4	29	24,37%
3	2	1,68%
2	1	0,84%
0	0	0,00%
Total	**119**	**100,00%**

Table E.2: Average of the variable "Importance of Analytics functionalities in an HRIS" by role

Role	Average of the variable "importance"
C-level	5
HR Specialist | Generalist | Supervisor	4,76744186
HR Director | CHRO	4,736842105
CEO	4,666666667
HR Analyst | Administrator | Representative | Associate | Assistant | Recruiter	4,585365854
Global Average	**4,693693694**

Table E.3: Frequency of each answer to the multiple-choice question "What are the main features of the systems you would value the most in an HR Analytics Solution? Please, identify to the utmost three critical features"

Requirement	Absolute Frequency	Relative Frequency
Ease of analysis	58	76%
Dashboard	18	24%
Report	18	24%
Metric	10	13%
KPI	9	12%
Predictive components	7	9%
Real time data	5	7%
Export Function	4	5%
Track Goal Achievement	2	3%
Chart	1	1%
Benchmarking	1	1%
Alert System	1	1%

Table E.4: Frequency of each nonfunctional requirement elicited in the answers to the question "What would be your main concerns as a User/Manager/Administrator of an HR Analytics Solution? (in terms of Performance, Security, Capacity, and Reliability)"

Concerns	Absolute Frequency	Relative Frequency
Security	43	36%
GDPR	16	13%
Access Management	13	11%
Real Time Data	3	3%

Table E.5: Frequency of each answer to the multiple-choice question “Which HR practices does your organization actively seeks to improve through HR Analytics?”

Practices to be analyzed	Absolute Frequency	Relative Frequency
Performance Appraisal	45	38%
Turnover	41	34%
Engagement	38	32%
Learning & Development	38	32%
Compensation and Benefits	37	31%
Recruitment and Selection Process	34	29%
Employee Experience and Wellbeing	29	24%
Workforce Planning	27	23%
We don't perform HR Analytics	24	20%
I am not sure	18	15%

Table E.6: Frequency of each answer to the multiple-choice question “What is the major obstacle for a better HR Analytics processes' implementation in your organization? - Fernandez & Gallardo-Gallardo (2020)”

Obstacles	Absolute Frequency	Relative Frequency
Suitable Software and Technology available to perform HR Analytics	40	34%
Insufficient skills, knowledge and competencies of HR professionals related with Analytics	33	28%
Management Buy-in and Interest in HR Analytics	26	22%
Lack HR Data Management	20	17%

Appendix F

JAD Sessions Output

Table F.1: User requirements brainstorming

Users want to...	*So they can*
Advanced analytics to dynamically infer competencies.	For example, worker job history, job assignments, or past work experience.
Provides embedded analytics to support decision-making.	Describe in detail your core HR reporting and analytics capabilities
Correlate data	For statistical analysis
Centralize data	To avoid data ambiguity
Benefits administration reporting and analytics capabilities	Provides embedded analytics to support decision making
Standard metric reports (cost per hire, time to fill, source, EEO-1)	Measure and make better decisions
Library of standard report templates	Reports for temporary employee usage and costs
Library of standard report templates	Report on number of potential candidates at each stage of recruiting process
Library of standard report templates	Reports on reasons candidates decline offers
Library of standard report templates	Report on individual and aggregate cost of job boards, newspapers, etc.
Ability to export info from the HRIS solution	Allow user to choose fields to report/extract data (job function, location, level, etc.)
Custom report creation	
Send reports by e-mail or as a link from system to desired parties	Share information with other users
Adverse impact ratio analysis that shows job groups where females/minorities are underrepresented	Act and Make decisions
Provide standard, real-time reports that can be run on demand	Update, real time info about our population
Limit access of information	Allow access to reports and dashboards based on role

Users want to...	*So they can*
Allow users to filter and sort information to create custom views	
Dashboard and analytics for executives, managers, and administrators	Visualize data
Visualization tools improve visibility into performance management processes and conditions, as well as discerning trends and projections	Visualize data
Export data/ reports, such as Microsoft Office tools	Share, and treat information outside of the system
Ability to create custom reports that can be saved in a library for access by other users	
Alert/notification system advising of updated reports via subscription service	
Provide wizards so users can create custom reports	Ability to easily create reports
Predictive analysis	Prediction of results
multiple chart options	
multiple preset variables to use and create charts	

Table F.2: Analysis of the existing Analytics products' features

Competitor	*Name of the feature*	*Description*
BambooHR	Fixed Dashboards	The application provides pre-defined dashboards on Headcount, payroll, recruitment
SAGE HR	Custom Reports	The application enables the users to customize reports
SAGE HR	HR dashboard	Various HR Metrics
SAGE HR	Headcount	evolução do headcount, descreve o tipo de contratação
SAGE HR	Turnover	Employee turnover reports over time, by team or location, voluntary/involuntary
SAGE HR	custom Reports	
BambooHR	Custom Reports	Custom Reports
BambooHR	turnover	razões de saída, turnover por manager, antiguidade
BambooHR	headcount	
BambooHR	Recruitment	Sources of recruitment
Namely	HR Insights	Comprehensive and visual hub for the HR data you need to drive decisions
Namely	Benchmarketing	
Namely	Diversity	Get a holistic view into your business and your people
Namely	Attrition	Have the most critical HR KPIs at your fingertips - in real-time
Namely	time off	Track trends and identify red flags proactively
Namely	ad hoc report writer	Intuitive tool to create custom reports to meet your needs - without the need for technical support
Primavera BSS	Payroll dashboard	Employee distribution by departments, academic background, pay, work accidents and associated costs, absenteeism, training needs, entries and exits of personnel, among other data.
Primavera BSS	Human Capital dashboard	https://pt.primaverabss.com/pt/pagina/recursos-humanos/
Factorial	HR analysis and reports	Different styles of visualization, a gallery with predetermined reports, sharing and download from excel
Factorial	Report panel	Custom control panel. All organization's data updated in real-time from a one-click distance
Paylocity	Dashboard. Demographics	View real-time employee data and performance metrics
Paylocity	Utilization	Translate system usage into time and cost savings and employee engagement.
Paylocity	Position Management	Understand position-level data to plan for roles, make staffing decisions, and predict changes.
Paylocity	Headcount	Analyze active or terminated employee counts to see turnover and change over time.
Paylocity	Retention	Pinpoint at-risk employees by analyzing factors like drive time and compensation.
Paylocity	Labor Costs	View a summary of labor costs and diagnose hidden overspend or top cost centers.
Paylocity	Turnover	Recognize top turnover trends with bubble charts to identify areas to improve retention.

Competitor	*Name of the feature*	*Description*
Paylocity	Powerful Reporting	Create, schedule, and “favorite” your custom reports with a single database.
Workday	Reports	
Workday		Average age
Workday	Headcount	Employee Headcount by company
Workday	Headcount	Employee pay by generation
Workday	Headcount	Employee Headcount by gender
Workday	Headcount	Employee Headcount by management level
Workday	Headcount	Nearing retirement in critical jobs
SAP Success Factors	SAP Analytics	The application provides pre-defined dashboards on Headcount, payroll, recruitment
Workday	Custom Reports	The application enables the users to customize reports
Kronos		See how well your attendance policies are working
HUMAANS		Learn about turnover, headcount changes, salary spend, and tenure, and follow time off trends in seconds without any manual work.
HUMAANS		An updated snapshot of team composition and headcount fluctuation without tedious manual exports
HUMAANS		Monitor and compare time off trends to make sure your team is well-rested and take action as needed.
HUMAANS		Quickly extract any data point about your employees and rewind time to see historical data points, including past salaries, job roles, and off-boarded employees.
HUMAANS		Access the full historical changes for compensations, roles, and time-off balances.
SAP Success Factors		Create rich reports and HR dashboards to share information
SAP Success Factors		Dig deep into topics, such as diversity, engagement, and turnover, with interactive data exploration
Mirro		You get management reports packed with retention, diversity, and capacity planning insights.

Table F.3: Defining User Profiles

	Users. Who are they?			
Roles	*Academic Background, Skills, and competencies*	*Skills in HR Analytics*	*How can they benefit from HR Analytics*	*Pains using HR Analytics*
Management (C-Level, BoD, etc.)	Degree in the STEM Areas	Attention to detail	Manage their own team	Efficiency
	Continuous improvement	What data is important for the work	Help with decisions	Cross a high level of data
		Know-how in HR analytics	Identify weakness	Data availability
		Raw data analysis	Identify strengths	Wrong data analysis
		Process analytics	Objective decisions	
		Data selection	Lower the costs	
		Integrity in data information	Unnecessary costs	
Human Resources	Human Resources, Management, Psychology, Sociology Degree	Some technological ability (e.g., Office suite)	Data reliability	Data reliability
	Skills: Communication, Analytical Thinking, Teamwork	Ease in relating diverse information (data or empiric)	Decision-making	Inadequate data collection
	Adaptability and innovative mindset	Lack of Know how in quantitative methods	Ease of access to processed information	Translating data into information (data interpretation)
	Compliance management, emotional intelligence, Flexibility	Lack of data management skills	Organized Data	Know-how in quantitative methods
		Generalist HR Knowledge	Cross-analysis between different subjects	Conception of dashboards
			Correlation of different data sources	Information may not translate full reality
			Improves communication with several stakeholders (Management, Organization, External Partners, Potential candidates, among others)	
			It allows to predict problems and monitor some metrics	

Table F.4: First Classification of User Requirements

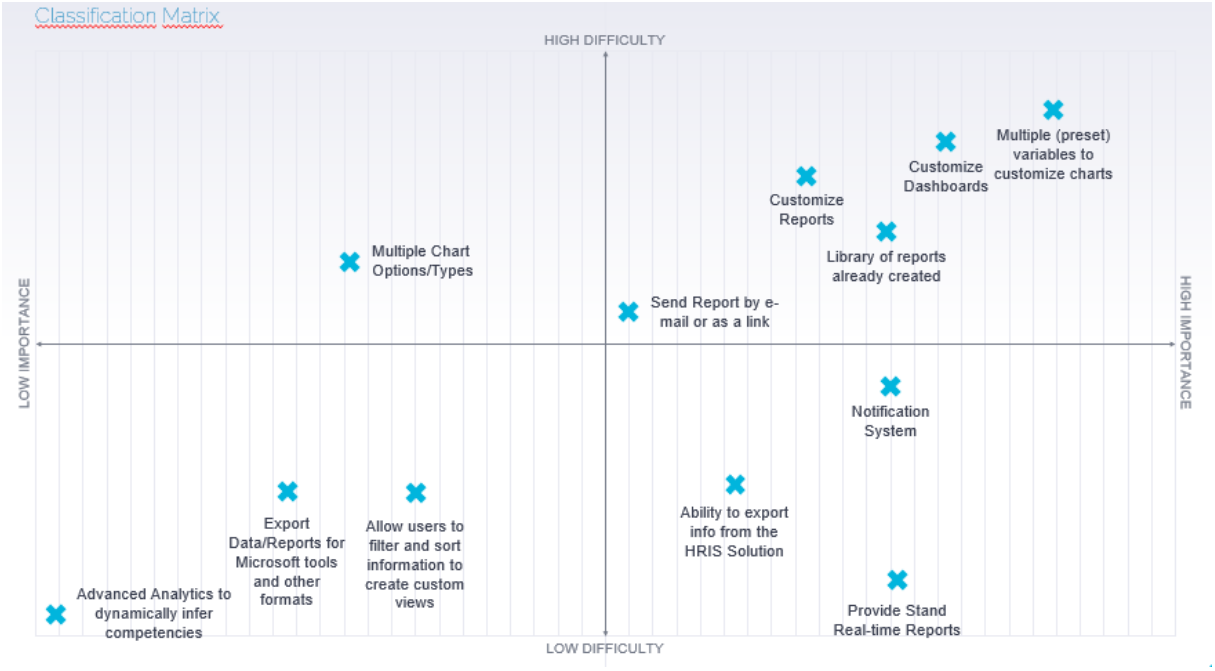


Table F.5: Consolidated User Requirements of the first JAD Session

ID	*Task*	*Quadrant*	*Votes*
1	**Multiple (preset) variables to create charts**	**High Difficulty | High Importance**	**2**
2	**Create and customize Dashboards**	**High Difficulty | High Importance**	**5**
3	**Create custom reports that can be saved in a library for access by other users**	**High Difficulty | High Importance**	**2**
4	**Custom Report Creation**	**High Difficulty | High Importance**	**1**
5	**Provide wizards so users can create custom reports**	**High Difficulty | High Importance**	**1**
6	**Send Reports by e-mail or as a link**	**High Difficulty | High Importance**	**2**
7	**Alert/notification system advising of updated reports**	**Low Difficulty | High Importance**	**5**
8	**Ability to export information from the HRIS Solution**	**Low Difficulty | High Importance**	**3**
9	**Provide Standard, Real-Time reports, on-demand**	**Low Difficulty | High Importance**	**3**
10	**Allow users to filter and sort information to create custom views**	**Low Difficulty | Low Importance**	**3**
11	**Export Data/Reports for Microsoft Tools (Excel), and other data formats (R, Py, etc.)**	**Low Difficulty | Low Importance**	**1**
12	**Advanced Analytics to dynamically infer competencies**	**Low Difficulty | Low Importance**	**0**
13	**Multiple Chart Options/Types**	**High Difficulty | Low Importance**	**2**

Table F.6: Final Consolidation of User Requirements of the first JAD Session

Task Name	*Joint Votes*	*Classification Matrix Quadrant*
Customize Charts	**2**	**High Difficulty & High Importance**
Create and customize dashboards	**5**	**High Difficulty & High Importance**
Custom Report Creation	**4**	**High Difficulty & High Importance**
Share reports created in the module	**2**	**High Difficulty & High Importance**
Notification system about reports	**5**	**Low Difficulty & High Importance**
Create Custom Views	**3**	**Low Difficulty & Low Importance**
Exporting to several formats	**4**	**Low Difficulty & Low Importance**

Table F.7: Nonfunctional requirements

Nonfunctional Requirement	*Description*
Operational	The system should be fully integrated with the current HRIS Solutions
	The solution should support HTTPS web protocols, SSL
	The system should be able to work on any browser
	The system should be run on mobile devices
	The system should enable integration with ActiveDirectory/LDAP and Single Sign-On policies
Performance	The system should be available for use 24/7
	Be able to allow at least 120,000 user access without affecting the performance level.
	The system must provide the capability of backing-up User and System data. The backup procedure should address backup frequency, manual and automated backup, and media type.
Security	Access to the module should be done with a username and password
	There should be different access levels to the different components/menus of the Module
	Capture an audit log of additions, deletions, and edits. The log must include the date, time, and user that effected the change, the nature of the change, as well to see the previous state of the record affected. The logs should be date-driven.
Cultural and Political	It should meet all GDPR policies
	Quidgest should be certified with the international referral of Information Security Management NP EN ISO 27001:2013, and there might be audits throughout the project

Table F.8: Business Requirements defined in the first JAD Session

Business Requirements *Define the overall goals of the system and help clarify the contributions it will make to the organization's success*	
Stakeholder	*Why is the HR Analytics Module relevant for that Stakeholder?*
HR	Ease of working with large volumes of data
	Facilitate data extraction
	Analysis and suggestion of action plans
	Elaboration of career plans
	Elaboration of training plans
	Analysis of employee motivation
CEOs/Board of Directors/Management	Support for strategic decision making
	Decision-making supported by statistical data
	Identification of recruitment needs
	Identification of training needs
	Allows alignment between the HR department and the organization as a whole
	Allows the definition of development policies.
	Better knowledge of your department
Organization	Facilitates the dissemination of information to all employees
	Knowledge of the organization's universe
	Allows changes in the overall policies of the organization
	Allows reviewing Human Resources policies
	Sharing of company information
	Forecast company growth
	Turnover forecasting
	Real time data analysi

Table F.9: Final list of user and functional requirements

ID	*User Tasks/Requirements*	*Functional Requirement*
1.1	**Customize Charts**	Have multiple preset variables for the user to choose from and define the chart
1.2		The Charts should have data filters
1.3		Have a set of recommended charts
1.4		The system should enable users to select different colors for the different components of the graph chosen
1.5		Ability to create multiple chart types (e.g., Pie, Bars, Columns, Line, Area, Stacked, Gauges, maps, among others)
2.1	**Customize Dashboards**	The system should enable users to customize dashboards and have these different components:
2.2		Cards with metrics and KPIs
2.2.1		Charts
2.2.2		Lists
2.2.3		Maps
2.3		It should be possible to drill down the data displayed
2.4		There should be a drag and drop feature to organize the different components of the dashboard
2.5		The dashboard should have a data filter that affects the whole dashboard
2.6		Each component of the dashboard should be redimensionable
2.7		There should be the possibility to take notes in the dashboard
3.1	**Pre-defined Dashboards**	There should be a drag and drop feature to organize the different components of the dashboard
3.2		There should be pre-defined dashboards on the following HR Topics:
3.2.1		- Demographics

3.2.2		- Diversity & Inclusion
3.2.3		- Payroll
3.2.4		- Training
3.2.5		- Recruitment & Selection
3.2.6		- Performance Appraisal
3.2.7		- Attendance/Absenteeism
3.2.8		- Turnover
3.2.9		- Engagement
3.3		The dashboard should have a data filter that affects the whole dashboard
4.1	**Ability to set goals/targets and easily track its progress**	Have a specific page where using gauges and other charts, users can define goals/targets for different metrics
4.2		Ability to set deadlines to meet the goal/target
4.3		On the same page, close to the gauge (or other charts), have the deadline for that target, and how many days/months are missing
4.4		Ability to drag and drop the different gauges and charts
4.5		The system should enable the user to define the priority to meet the different goals/targets
4.6		The system should enable the user to define the organizational impact of the different targets
5.1	**Customize Reports**	Use Report Wizard for Report Configuration
5.2		Ability to select the columns and lines desired for the report to be generated
5.3		Ability to select periods, if desired
5.4		The system should ask the user if the report should include active and/or inactive employees
5.5		It should be possible to define calculations (e.g., operations between columns and lines) and conditions

5.6		It should be possible to configure not only lists but to add charts as well
6.1	**Save the structure of reports and charts defined - Library**	When creating specific reports and charts, the system should enable the user to save a certain configuration for later use
6.2		The user should be able to define if it is a shared or not configuration with the other module's users
6.3		It should be possible to save the configured dashboards and attribute a name to it
7.1	**Share Dashboards/Reports/ Charts**	Transpose the intended Reports/Charts/Dashboards to an e-mail template
7.2		Generate a link to be shared with other Module Users
7.3		Make the dashboards/reports/charts available to other users in their self-service
7.4		Have a mechanism that enables users to share the data when they want (like a "enable" and "disable" button)
7.5		
8.1	**Notification System**	When a report is ready to be exported, the system should notify the user
8.2		If there are multiple interested parties in that report, the user should be able to select those users, and they will receive a notification as well
9.1	**Favorite View**	Each user should be able to have their view (dashboard) on the first page.
9.2		Users should be able to share their favorite first page with other users
10.1	**Export Charts/Reports/Dashboards to several data formats**	It should be possible to export the dashboards/reports/charts to excel
10.2		It should be possible to export the dashboards/reports/charts to Word
10.3		It should be possible to export the dashboards/reports/charts to PDF
10.4		It should be possible to export the dashboards/reports/charts to PNG and .jpeg
10.5		It should be possible to export the dashboards/reports/charts to CSV
11.1	**Reporting Requests**	Create a new type of request inside the system so that employees and managers may submit Reporting requests to the HRAM Users

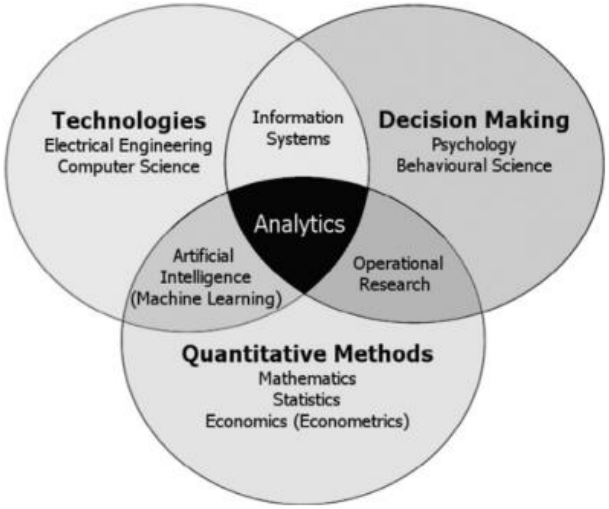
11.2		When submitted, the Module's users may Accept or Reject the request
11.3		There should be planning and management features available for the users to organize their work, such as:
11.3.1		- Delivered or not to the requester (done/not done)
11.3.2		- Planning dates
11.3.3		- Prioritization
11.3.4		- Have the requests organized in a list with the possibility to sort them and filter it in the system
11.4		The system should notify the requester when the report/chart/dashboard is ready to be analyzed via e-mail
11.5		The system should notify the requester when the report/chart/dashboard is ready to be analyzed through a notification in the requester's Self Service portal
12.1	**Correlation Analysis**	Give the user the possibility of choosing predefined variables to run the analysis
12.2		The user should be able to select multiple variables at the same time so that all the variables are correlated (as it is in SPSS)
12.3		The output should consist of the result of the Pearson Correlation and the Significance level (2-tailed)
12.4		Significant Correlations should be in bold
12.5		Translate the output data of the correlation analysis into information. For example, depending on the Correlation value, translate it into "No correlation", "Weak Positive Correlation," "Strong Negative Correlation," etc.
12.6		Show the correlation graph as output
12.7		The user should be able to export the analysis to excel
12.8		The user should be able to export the analysis to PDF
12.9		The user should be able to save combinations of variables in a library and update the results of the analysis when needed
13.1	**Regression Analysis**	Have a set of predefined variables to use

13.2		Give the user the possibility to choose multiple variables (and not only the possibility of linear regression)
13.3		When it is linear regression analysis, the graph of the analysis should be generated
13.4		The user should be able to export the analysis to Excel
13.5		The user should be able to export the analysis to PDF
13.6		The user should be able to save combinations of variables in a library and update the results of the analysis when needed

Appendix G

Figures

Figure 11. Figure that displays the intersection of disciplines of Analytics



Note. From *Operational research from Taylorism to Terabytes: A research agenda for the analytics age*, by Mortenson, M. J., Doherty, N. F., & Robinson, S., 2015. *European Journal of Operational Research*, *241*(3), p. 586. https://doi.org/10.1016/j.ejor.2014.08.029

Figure 12. Seven competencies of a world-class people analytics team

HAVE	BE GOOD AT	HAVE	MASTER TECHNIQUES OF	HAVE STRONG	MASTER	HAVE EXPERTISE IN	
GOOD DATA	STORY TELLING	BUSINESS ACUMEN	VISUALISATION	PSYCHOLOGY SKILLS	NUMBERS AND STATISTICS	CHANGE MANAGEMENT	MAXIMUM IMPACT
X	STORY TELLING	BUSINESS ACUMEN	VISUALISATION	PSYCHOLOGY SKILLS	NUMBERS AND STATISTICS	CHANGE MANAGEMENT	Unable to perform analytics
GOOD DATA	X	BUSINESS ACUMEN	VISUALISATION	PSYCHOLOGY SKILLS	NUMBERS AND STATISTICS	CHANGE MANAGEMENT	Unable to get the message across
GOOD DATA	STORY TELLING	X	VISUALISATION	PSYCHOLOGY SKILLS	NUMBERS AND STATISTICS	CHANGE MANAGEMENT	Focus on the wrong problems
GOOD DATA	STORY TELLING	BUSINESS ACUMEN	X	PSYCHOLOGY SKILLS	NUMBERS AND STATISTICS	CHANGE MANAGEMENT	Boring and confusing output
GOOD DATA	STORY TELLING	BUSINESS ACUMEN	VISUALISATION	X	NUMBERS AND STATISTICS	CHANGE MANAGEMENT	Bias and unable to interpret results
GOOD DATA	STORY TELLING	BUSINESS ACUMEN	VISUALISATION	PSYCHOLOGY SKILLS	X	CHANGE MANAGEMENT	Poor analysis
GOOD DATA	STORY TELLING	BUSINESS ACUMEN	VISUALISATION	PSYCHOLOGY SKILLS	NUMBERS AND STATISTICS	X	Unable to turn insights into outcomes

Note. Adapted from "The best practices to excel at people analytics," by Green, D., 2017, *Journal of Organizational Effectiveness*, *4*(2), p. 138. https://doi.org/10.1108/JOEPP-03-2017-0027

Figure 13. Presentation slide of the first JAD Session

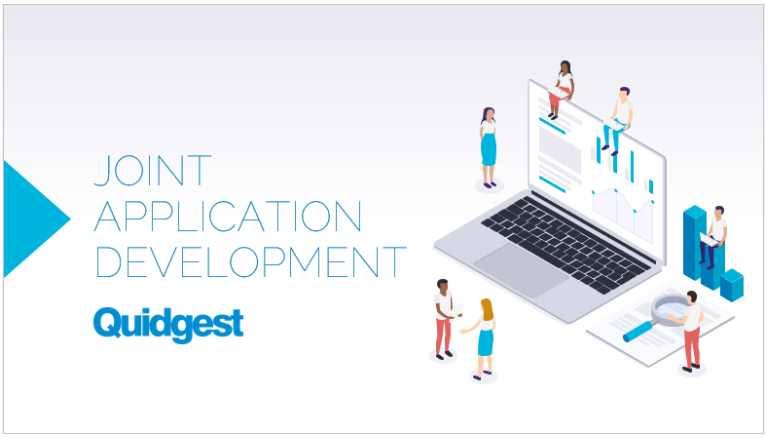


Figure 14. Slide with the agenda of the JAD session

Figure 15. Conveying the goals of the session to the JAD session workgroup

Figure 16. consolidation of what is HR Analytics in pairs

Figure 17. Slide of the JAD Session for the workgroup to discuss and define the users

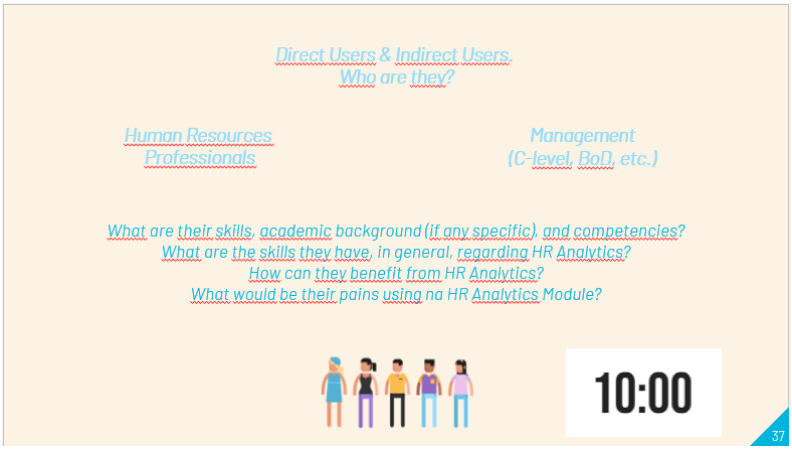


Figure 18. Slide of the JAD session for participants to brainstorm on User Requirements, by defining Job Stories