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Master's Degree Program in  
**Data Science and Advanced Analytics**

**A Business Intelligence Framework to support a sales  
department**

The use of Business Intelligence to aid business decisions

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Internship Report

presented as partial requirement for obtaining the Master Degree Program in Data Science and Advanced Analytics

**NOVA Information Management School**  
**Instituto Superior de Estatística e Gestão de Informação**

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# **A BUSINESS INTELLIGENCE FRAMEWORK TO SUPPORT A SALES DEPARTMENT**

by

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Internship report presented as a partial requirement for obtaining the Master's degree in Advanced Analytics, with a specialization in Business Analytics

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## STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledge the Rules of Conduct and Code of Honor from the NOVA Information Management School.

Luis Reis

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*Lisbon, 03/11/2022*

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## **ABSTRACT**

As the digital world continues to thrive, data is becoming one of the most valuable assets on the planet. Making Business Intelligence & Analytics, one of the most important tools used to transform the large amount of data generated into actionable insights, that support and improve management decision-making, across the different business activities inside organisations.

Businesses must keep evolving to stay competitive in this technological environment. For this reason, business needs and requirements need to be continuously reviewed and updated. Inside EDP Comercial, where this internship occurred is no different. This project focuses on analysing and understanding the current problems for a set of sales reports delivered to the management teams inside a sales department. The proposed solution is to create a new Business Intelligence framework that will allow to transform and improve the sales data and at the same time improve the reporting system inside the department. For the development of this framework, an Extraction, Transformation, and Loading (ETL) system was created for the sales data, a new data model and new Microsoft Power BI reports. With this solution, it will be possible to have daily updated information on how the business is performing, guiding the organisation towards the right business decisions and data analysis sooner and with better quality. In the future, it will be possible to use this framework for other types of data that are delivered in the department.

## **KEYWORDS**

Organisations; Business Intelligence & Analytics; Decision-making; Reporting; Microsoft Power BI

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## LIST OF ABBREVIATIONS AND ACRONYMS

<b>BI</b>	Business Intelligence
<b>BI&amp;A</b>	Business Intelligence and Analytics
<b>SSBI</b>	Self Service BI
<b>ETL</b>	Extract Transform and Load
<b>URL</b>	Uniform Resource Locator
<b>DCP</b>	Presential Channels Department
<b>EDP</b>	Energias de Portugal
<b>CRM</b>	Customer Relationship Management
<b>ES</b>	Enterprise Systems
<b>SQL</b>	Structured Query Language
<b>DW</b>	Data Warehouse
<b>SAS</b>	Statistical Analysis System
<b>DSS</b>	Decision Support System
<b>KPI</b>	Key Performance Indicators
<b>YTD</b>	Year to Date
<b>MTD</b>	Month to Date
<b>M</b>	Month
<b>M-1</b>	Previous Month
<b>RPA</b>	Robotic Process Automation
<b>DAX</b>	Data Analysis Expressions

# 1. INTRODUCTION

In the current business environment, data is considered one of the most critical assets for a company. The quantity of data generated daily continues to grow, requiring businesses to rely more on outside expertise and information to improve their creativity and performance (Božič & Dimovski, 2019). As Van-Hau Trieu stated, "Business Intelligence & Analytics (BI&A) were initially used for decision-making support activities. They have been increasingly considered for organisational learning and adjustments, improving operational efficiency, and strengthening organisational intelligence" (Trieu, 2017). Moreover, it is proven that information takes a big part in the success or failure of organisations (Citroen, 2011).

Most organisations are now having difficulty processing a wide variety of pertinent data due to enormous data quantities and complexity. However, because many managers occasionally lack timely access to data, they make judgments based on their hunches or expertise, which can diminish productivity and lead to imprecise decision-making. The ability of organisations to quickly access pertinent information and integrate it into decision-making processes is one of the success factors in the knowledge age. This, of course, leads to the necessity of the creation of business intelligence solutions to analyse the massive amounts of data present in organisations and to produce the appropriate information for decision-making processes (Abusweilem & Abualous, 2019).

EDP Comercial just like most organisations strive to respond swiftly and efficiently to business problems encountered, based on valuable and reliable information that allows them to make the best decisions possible, as the environment is continually changing.

This internship took place Inside the Presential Sales Department, more precisely on an analytics squad, whose main objective is to create and maintain all the reporting that is delivered to the department director and to the management of each presential sales channel. The reports provide the ability to track and analyse the performance and overall health of the business while identifying areas for improvement and opportunities for growth (Chan, 2020).

Organizations by conducting daily business, selling products and services to clients, generate a vast amount of data. This data needs to be treated and analysed to produce significant insights to management teams. Organisations more and more tend to resort to Business Intelligence as a technique to deal with this problem.

Currently, in the Presential Sales department, there are multiple Microsoft Power BI reports available that provide information to the different management teams. Some of those reports are about the sales made by each channel and provide vital information on how the business is performing and assist to identify business constraints or improvement opportunities.

There were several problems encountered in the information that was being presented on the sales reports and with the reporting process:

- Information structure not normalised between channels;
- Different sales ETL systems between channels;
- Duplicated information;
- The amount of information that one channel received was different from the others;
- The same business metrics and KPIs had different meanings to different channels;
- Some hierarchies inside the sales channels did not have direct access to the sales information;

- The look & feel of the reports and the quality of the information could be improved.

For these reasons, the department director initiated the rebranding project to solve the aforementioned problems. The main goal of this project is to build a new Business Intelligence framework for the department sales data. To a future extent, this solution could be also applied to other types of information that are currently being delivered. This new solution will consist of a new ETL process, followed by the design of a generic data model and the creation of brand-new Microsoft Power BI reports that will have the same information structure for all channels, normalised metrics/KPIs and a better look & feel than the old reports. This new solution will allow the end-users of each channel to analyse the sales information in a more efficient and on-time way, this way the management teams can track sales performance while identifying areas for improvement.

Before starting the development of this new framework, the department director requested two extra tasks.

The first request was a study about the utilisation and improvements that could be made to the reports delivered in the department. A survey was created for this purpose. Also, with this study, the end-users had the opportunity to give constructive feedback and ideas, that could be used in the revamping of the new reports.

The study had 4 main objectives:

- Identify which reports were analysed or not and at which frequency. In this way, it was possible to understand if any reports could be eliminated and at which frequency the data should be refreshed for each report;
- Identify in which format the end-users prefer to analyse the reports (self-service PBI, extracted PDF, or a print screen with the information on an email sent to the end-users after the data is refreshed);
- Understand if the end-users make additional analysis with the information provided and, if so if it was because of missing information or another reason;
- Since the rebranding project of the sales reports was ongoing, it was asked if the end-users had suggestions about the look & feel or new information they would like to see on the new reports.

The second request made, was the development of a reporting browser. Currently, the navigability between reports in the department is done independently and in a decentralised way, the end-users need to have a specific URL of the report that they want to analyse in Power BI online, which makes them keep a long list of URLs. Also, there isn't a complete menu with which reports are available for each user. With the reporting browser, each user will have a better quality of life accessing the reports and will clearly see which reports are available to them.

## **1.1. DOCUMENT STRUCTURE**

This internship report is organised as follows:

- In section 2 is presented a company overview of where the internship took place. It is described business details and the team of the author inside the organisation.
- In section 3 is presented multiple theoretical concepts related to this project, so the readers can have a better understanding of it.
- In section 4 is described a conceptual approach to the extra tasks requested and of the developed solution.
- In section 5 is described the work done and the results of the developments. An example in depth of the new sales reports is shown at the end of the section. All the data shown is fictitious and is only for a better interpretation.
- The remaining sections talk about the conclusions of the project and limitations.

## 2. COMPANY OVERVIEW

Energias de Portugal (EDP) is a multinational electric utility company, headquartered in Lisbon. The group's activities are centered on the generation, distribution and commercialisation of electric power and gas, having a strong presence in the energy sector all around the world as demonstrated by Figure 1 (Página da Intranet EDP, 2022).



Figure 1 - EDP Numbers (Página da Intranet EDP, 2022)

At EDP, "Changing Tomorrow Now" is one of the slogans that represent the constant change that has been the driver to offer more efficient, intelligent and sustainable solutions to the clients, doing their part to create a more balanced and sustainable world.

Its mission is "to be a global energy company, to lead on the energetic transition to create superior value" always following its business values, described in Figure 2, Initiative; Trust; Excellency; Sustainability; and Innovation. (Página da Intranet EDP, 2022)

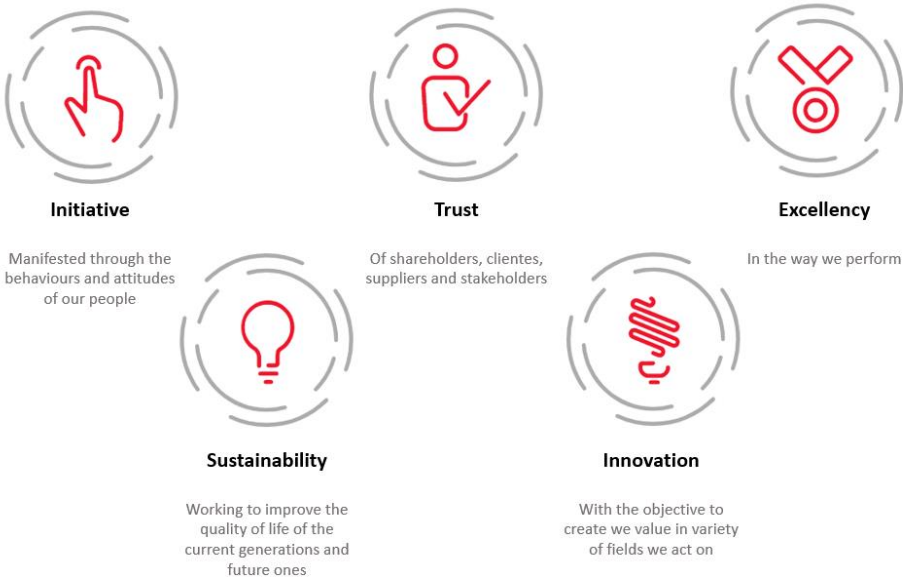


Figure 2 - EDP Business Values (Página da Intranet EDP, 2022)

This internship took place in one of EDP subsidiaries, EDP Comercial, more accurately in the Presential Sales Management Department. The department has five main sales channels. The main goal of each channel is to sell the most products/services and surpass the sales objectives set for them. The sales are divided into two stages, the presential sale and then the activation of the product/service sold if the client does not cancel the purchase. Figure 3 shows the presential channels' department organisational structure, going in-depth to show each channel hierarchy.

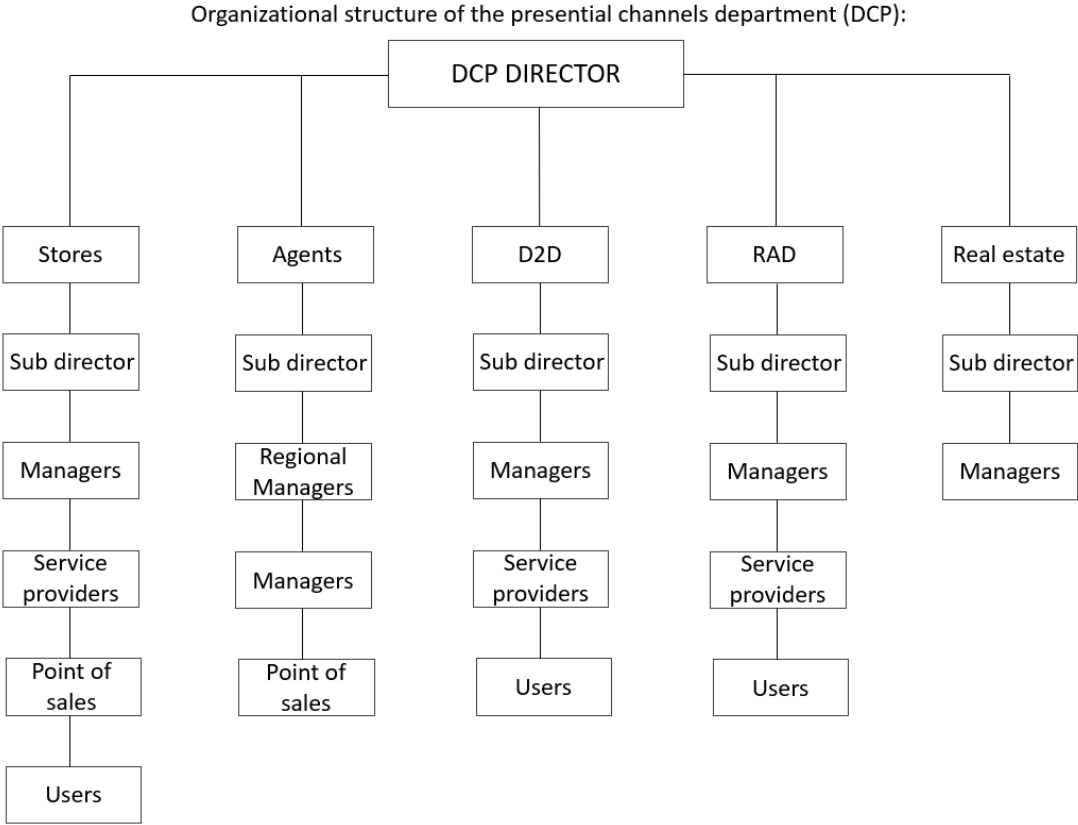


Figure 3 - DCP sales channels organizational structure

Figure 4 shows the products/services that are being offered to the clients across the channels.

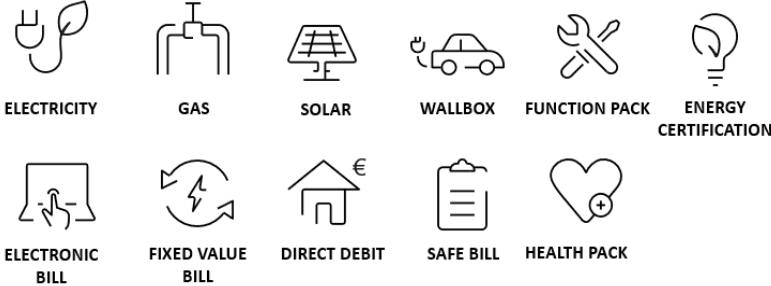


Figure 4 - Products/Services offered by the channels

Apart from the main sales channels, there are another 2 squads whose main objective is to assist the management teams and dynamise their work.

- Operations and Knowledge Squad – The operations support squad guarantees that at any time any commercial has what he needs to perform and how to do it.
- Analytics Squad – The analytics squad where the author did the internship is responsible for all reporting, being the pillar of information and making sure that everything is going in the direction it is supposed to and that the business is constantly challenged to perform more and better.

## **2.1. THE TEAM AND ACTIVITIES**

The analytics squad is responsible for all reporting inside DCP, whether is the creation of new reports or the maintenance of existing reports. It is also responsible for custom business analyses that are requested by the management and the channels. It also has a financial role in the department, it takes care of contracts and does budget planning. Recently was added to the team a component of Robotic Automation Process (RPA) that will help to automate the end-to-end reporting process. The team is a core part of the department making sure that everyone has the right information about the business and that the best insights are available to everyone.

On this project worked four members. Two team leaders whose job was to manage the team and assign tasks by utilizing an agile work methodology. The author of this report and another team member were responsible for all the developments on the rebranding project. Starting from the tasks requested by the director to all the steps done to reach the final sales reports.



### **3. THEORETICAL FRAMEWORK**

#### **3.1. REPORTING IN ORGANISATIONS**

The roots of competitiveness for many organisations have evolved away from traditional physical and financial resources, due to rapid technological development, smart consumers, and the importance of innovation. In fact, in the transition from the industrial age to the information age, organisations started to use advanced techniques to handle information. The advantages of doing so, include corporate development, greater financial performance, more effective strategic planning, and increased productivity (Cuganesan, 2006).

Managers see technology, data and analytics as a future powerful tool in business. Many organisations are therefore implementing business intelligence & analytics (BI&A) by utilising reporting to aid decision-making. Traditionally, management accounting was the primary tool for decision-making and control in an organisation. It is clear now that both can be linked and benefit from the new BI&A technologies. (Rikhardsson & Yigitbasioglu, 2018)

Reporting is a process that intends to deliver the best possible information in a timely way to the different levels of management. Reporting allows to assess the performance of an organisation and it serves as a very important tool for decision-making processes. Reporting has become critical for organisational success (Syed, 2016).

In today's competitive world, businesses face significant challenges. Information has unquestionably become a crucial source of competitive advantage in today's corporate world. Business intelligence (BI) is gaining popularity among businesses to cut costs, increase service quality, and improve decision-making processes (Foley & Guillemette, 2010).

Organisations need accurate and on-time information to make effective decisions. One way that is possible to obtain such information is from business reports. These reports need to be customisable to serve different objectives. However, Due to the difficulty to keep up with the rapidly increasing demand for information and analytics, decisions in most enterprises are still not based on BI. One way to satisfy this demand is to set up a self-service BI (SSBI) environment (Imhoff & White, 2011).

In general, reporting is an essential tool that businesses may utilise to promote the development and health of their enterprise. With it, organisations can be sure to anticipate results and further grow and develop their business. Without it, staying ahead of the competition will be harder (Syed, 2016).

#### **3.2. BUSINESS INTELLIGENCE & ANALYTICS**

With the amount of data generated and information to process, businesses tend to struggle to create value with it. Business intelligence and analytics (BI&A) has become a crucial research area for practitioners and academics (Chen et al., 2012). BI is well known as a Decision Support System (DSS) that integrates data collection, storage, and knowledge management with analysis to deliver proper information to decision-makers (Negash & Gray, 2008). A view of the past, present, and future is offered by BI tools. When it comes to information communication, the use of BI techniques closes the gap between intermediate and senior managers. It also gives managers access to the high-quality

information they need at each level, when they need it, to help them make better decisions (Zafary, 2020).

The BI concept was firstly used in 1958 by Hans Peter Luhn, an IBM computer scientist that wrote an article describing the potential of using technology and the right tools to collect, store and analyse data to turn it into usable information, so the right people at the right time can act on it "before the competition" (Foote, 2017).

After what Hans Peter Luhn wrote in his article about the potential of using technology, in the 1960s the first computer applications were starting to appear to process data, but the value of the information that would result was very limited (Watson, 2009). Throughout the next decade, various decision support applications were developed till the present where there are various phenomenal BI tools and applications.

### 3.3. BI ARCHITECTURE

Before implementing a BI solution in an organisation is important to make a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis (GÜREL, 2017). This analysis is a framework that enables an organisation to analyse internal and external elements that might shape or affect the same, making it possible to identify the business needs, seize new opportunities and minimise the risks (Leigh, 2010).

Figure 5 shows the traditional core components of a Business Intelligence system according to MUNTEAN & SURCEL (2013), the components are: "data sources; ETL (Extraction, Transformation and Loading) processes; enterprise data warehouse; and business analytics & tools" (MUNTEAN & SURCEL, 2013a).

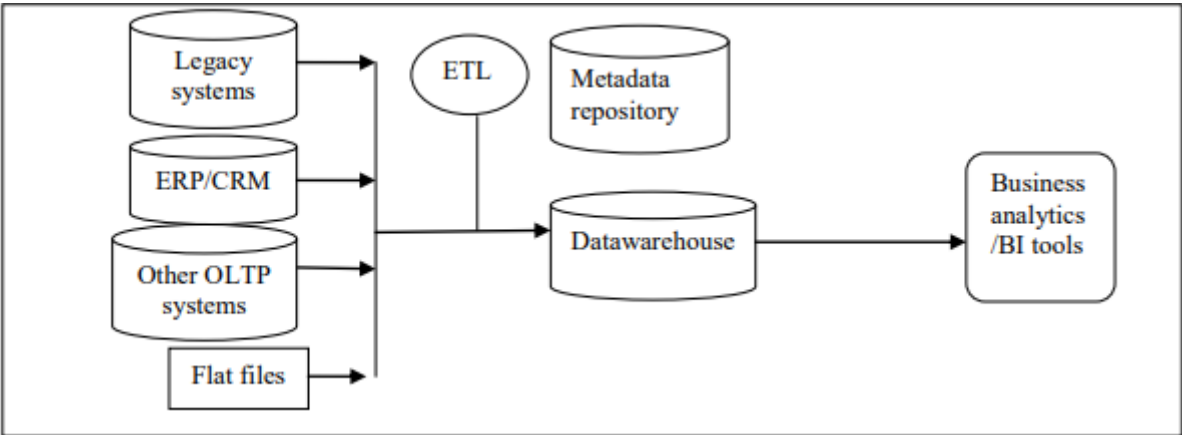


Figure 5 - Traditional core components in BI architecture (MUNTEAN & SURCEL, 2013a)

#### 3.3.1. Data Sources

The data sources inside an organisation can be collected through two types of sources: internal and external. Examples of internal data sources in organisations can be from human resources, customer relationship management and enterprise resource planning systems. This type of sources works with data about customers, products and sales data. On the other hand, external data sources have no

connection to the organisation itself, those are gathered from external sources like data suppliers, the internet, governments and market research organisations. (Ong et al., 2011)

Organisations should be sure to clearly identify their data sources. Having this knowledge is a powerful tool to address certain business questions and requirements, leading to substantial time savings and quicker information delivery. Additionally, the information may be applied to make data replication, data cleaning, and data extraction easier (Reinschmidt & Allison, 2000).

### **3.3.2. ETL & Data Warehouse**

As stated by Kimball & Ross (2013) the ETL process begins with the extraction of data, from the data sources systems into a data warehouse. The extraction process must identify and collect all the relevant data from the data sources. After the extraction, the data (often in a staging area) will go through multiple transformations, data cleaning, data augmentation and data combination from multiple datasets. This process also includes defining business logic for data mapping and information standardisation to provide consistency across the information inside the organisation. The final step of this process is to load the data into the target repository. (Ong et al., 2011)

The ETL processes can be seen as 5 simple main steps: (Simitis et al., 2005)

- Extraction of the relevant information from the data sources;
- Moving the information into the staging area;
- Transformation of the information that was extracted from multiple sources into a common format;
- Cleaning, data set augmentation and creation of business rules;
- Loading the final data to the Data Warehouse.

A data warehouse is one of the most important components in a BI architecture. As defined by Reinschmidt & Allison (2000), "A data warehouse (DW) is a database where data is loaded with the objective of analysing and retrieving insights from it. A data warehouse stores historical data for the purpose of long-term analysis. The data is loaded from various information systems, by an ETL process".

As expressed by (Kimball & Ross, 2013) Data warehousing and business intelligence systems have a variety of goals that should be converted into DW requirements:

- Understand the business users;
- Understand the users responsibilities, goals and objectives;
- Deliver high-quality and accessible information;
- Present accurate data and in a timely way;
- Be ready to adapt to changes in business;
- Maintain the business users trust and serve as a mean to improve their decisions.

Data warehouses (DWs) are recognised to focus more on decision support rather than transaction support, and that online analytical processing (OLAP) is mostly what characterises them. OLAP programs have historically been built on multidimensional modeling, which intuitively displays data as a cube whose cells hold events that occurred in the business area (Rizzi et al., 2006).

Online analytical processing (OLAP) allows business users to manipulate data using sophisticated tools to navigate dimensions like time or hierarchies. It offers multidimensional and condensed views of organisational data, and it is used for modeling, reporting and analysis to optimise the business (Ranjan, 2009).

### **3.3.3. Data Presentation**

Once the data is ready to use, it begins the extraction of business value from the BI framework. This value is passed on too many potential users, that can include: (Watson, 2009)

- IT developers;
- Data Analysts;
- Management teams and executives;
- Suppliers and customers.

These users normally access the available information in the data presentation area through a variety of tools and applications, the most common being: (Watson, 2009)

- SQL queries;
- Drillable/OLAP reports;
- Microsoft Excel;
- Dashboards and scorecards.

The tools that present information in various forms to various people make up the end user layer. These tools can be organised in a hierarchical manner, as one moves from the bottom to the top of the hierarchical levels, the degree of comprehensiveness of data being processed and presented increases. This is explained by the need to make more complex decisions as one moves up in the organisational hierarchy (Ong et al., 2011).

Data visualisation tools like dashboards, reports and scorecards will provide management teams and executives a broad perception of the business performance and progress towards business goals by viewing detailed information about key performance indicators (KPI) and visualisations that indicate the overall health of their business (Ranjan, 2009).

## **3.4. DATA FLOWS**

The difficulty of organising data in the present environment into well-formed, usable information increases as the data volumes increase each day. To transform these huge amounts of data into usable insights, that are ready for analytics, to build visualisations, reports and dashboards, it is now possible to create data flows inside the Power BI service. They can be used for self-service data preparation followed by storing the data as entities in Microsoft common data model compliant folders. One of the biggest advantages when using data flows is the possibility of reusing transformation logic between various datasets and reports inside Power BI. It is possible to combine and utilise the information on several data flows to load data into different reports (Microsoft, 2021).

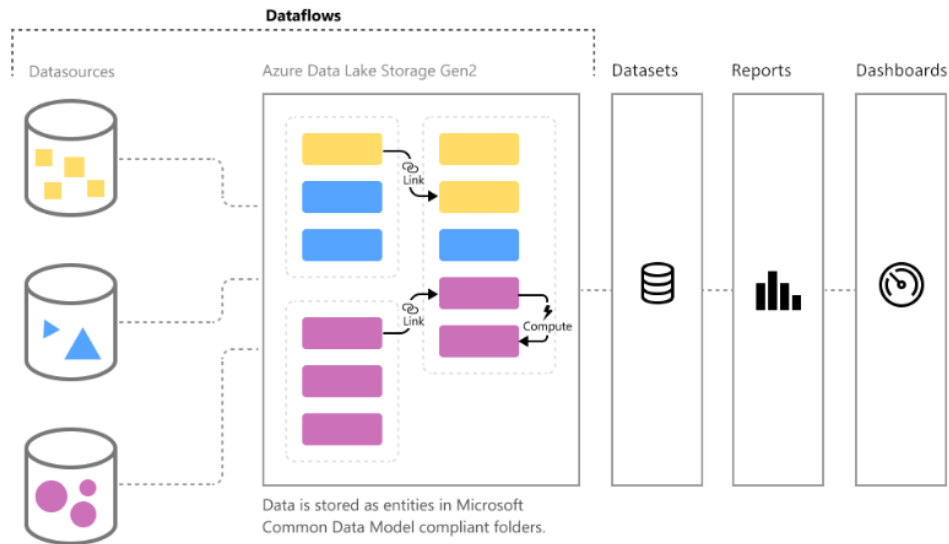


Figure 6 - Data Flows component in a self-service environment (Microsoft, 2021)

### 3.5. SELF-SERVICE BI

Businesses must utilise business intelligence (BI) to make better and quicker decisions in the current environment. The ability to use BI offers businesses a powerful set of tools (Imhoff & White, 2011). Studies have shown that Self-Service BI (SSBI) frameworks give positive value to companies, by improving their processes, decision making and the ability to provide the end-users to become more self-reliant and less dependent on IT (Daradkeh & Al-Dwairi, 2018). With the help of SSBI, non-BI experts should be able to execute customised analyses and extract useful information from vast volumes of complex data with ease (Alpar & Schulz, 2016). Business users now have access to increasingly decentralised BI implementations, that provide them with self-service analytics and data discovery capabilities because the IT department fails to satisfy the analytical demands of business professionals (Meulen & Rivera, 2015).

Claudia Imhoff and Colin White described SSBI as "The facilities within the BI environment that enable BI users to become more self-reliant and less dependent on the IT organisation. These facilities focus on four main objectives: easier access to source data for reporting and analysis, easier and improved support for data analysis features, faster deployment options such as appliances and cloud computing and simpler, customisable, and collaborative end-user interfaces" (Imhoff & White, 2011).

### 3.6. WATERFALL METHODOLOGY

As stated by Ruël (2010), "The Waterfall approach has been the dominant approach for enterprise systems (ES) implementation since the 1970s. It offers ES project managers a simple, step-by-step way to make ES projects manageable and minimize drawbacks" (Ruël et al., 2010). It is an incredibly easy-to-use and comprehend methodology. There is no overlap between stages in a waterfall model, each step must be finished before the subsequent phase can start (Bulman, 2017).

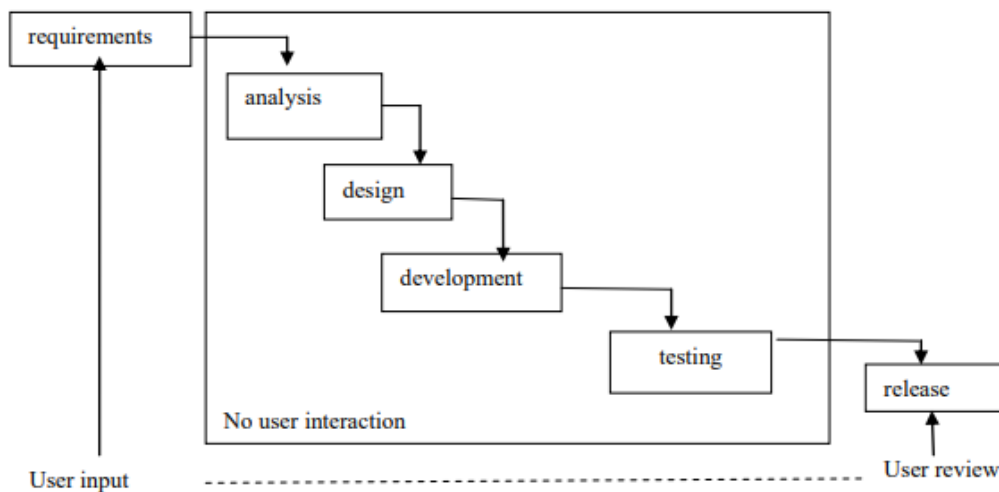


Figure 7 - Waterfall approach to the development of BI solution (MUNTEAN & SURCEL, 2013b)

The waterfall methodology's main goal is to divide the implementation of a solution into well-defined tasks, requiring proper project planning. The project requirements must be clear in the initial phases of the project, and everyone involved must be aware of those requirements (Sherman, 2015).

Using the waterfall methodology approach for BI has problems that can't be ignored (MUNTEAN & SURCEL, 2013b).

Main problems:

- Long times between the business requests and the solution deliveries;
- Not having feedback from users on several important phases of the implementation, by the users not being involved;
- Once the requirements are set, this methodology is inflexible to changes;
- Only testing and receiving feedback at the end of the implementation.

### 3.7. AGILE METHODOLOGY

In a rapidly changing economy, Business Intelligence solutions must become more agile. Agile means the ability to be adaptable more flexible and able to react faster to changing business requirements (MUNTEAN & SURCEL, 2013b). The traditional methods of BI implementation are no longer efficient. The inability to request adjustments on time, an excessively long timeframe, and unnecessarily complex methods do not satisfy client expectations (Kisielnicki & Misiak, 2017). Agile methods brought a new view to project delivery. Delivering the actual product throughout iterations leads the way for success to come more swiftly.

A key characteristic in agile development is flexibility, collaboration, periodical demonstrations and feedback. The primary objective of all face-to-face Agile meetings is team collaboration and decision-making. Involving the end-users in the collaboration results in a higher proximity with the project which is proven to be an important factor for project success (Prouza et al., 2020).

The most common form of Agile used for BI implementation is Scrum. The requirements are divided into smaller sets of tasks, each task normally lasts for 1-2 weeks (also known as a sprint). At the end of

each sprint, the work done is presented to the end-users and with each iteration, the solution gets closer to the final version desired (Simi) Bajaj & Rai, 2018).

Figure 8 shows the typical agile BI cycle implementation.

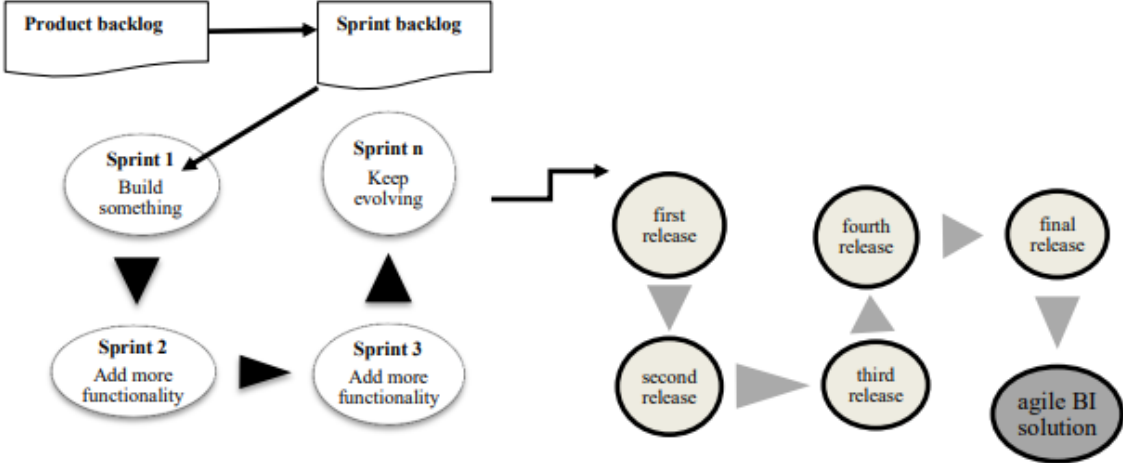


Figure 8 - Typical agile BI cycle (MUNTEAN & SURCEL, 2013b)

# 4. METHODOLOGY

## 4.1. CONTEXT

Various points must be looked at from the start of any project, especially when implementing a BI solution, including data integration, cleansing, modeling, warehousing, metrics generation, reports and more (Cerqueira, 2015). In this section is explained the methodologies used to formulate a work plan and create a workflow to accomplish the development of the Business Intelligence framework solution and the extra tasks requested. Starting with the conceptual idea of the project plan, from the first project meetings to the first developments, data tables, metrics/KPIs and a suggested data model. Also, in the end, a conceptual report will be presented, which will work as a template for all future sales reports for each channel and respective hierarchies.

Figure 9 shows the conceptual project plan by phases. The project was divided into three phases, each containing three generic goals. The first phase starts with meetings with the department director, to clearly define which were the problems, needs and project requirements. In the second phase, the data needed to build the sales reports is collected, an ETL process is created and the transformed data is loaded into data flows inside Power BI Service Online. In phase three, a data model is built, followed by the creation of metrics in Power BI and finally the development of the newly rebranded reports. After each development a testing period took place, to ensure that everything works properly.

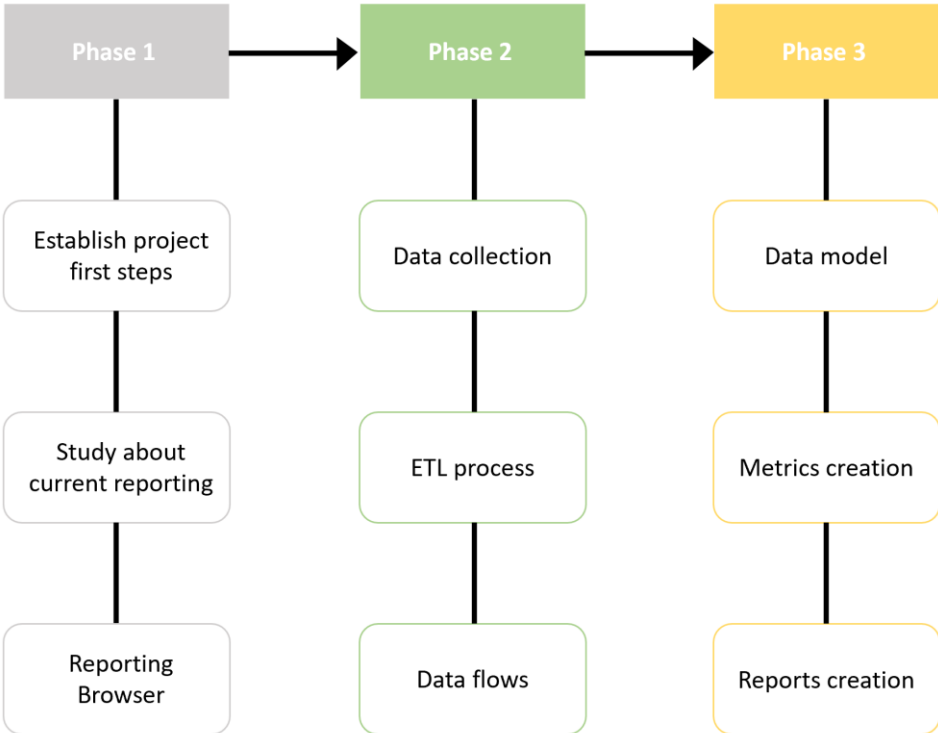


Figure 9 - Conceptual project plan



**4.2. FIRST STEPS**

After identifying the business needs and problems that motivated the rebranding project, the first step that the team did was to schedule weekly meetings with the department director to define a project plan. Initially, it was intended for this project to be developed using a waterfall methodology approach. At the first meetings were discussed the requirements for the project, the look & feel of the new reports, which metrics and KPIs should be shown and it was requested two extra tasks apart from the creation of the reports. After a couple of weeks of starting the project, it was needed to adopt an agile methodology, more precisely scrum. The team started to have daily meetings about project developments, dividing the work by tasks, which were assigned to different team members. The agile approach happened due to the number of changes that were asked during the first weeks of working on the project. In this way, the end-users also contributed more throughout weekly meetings where the project progress was discussed and if needed, changes would be implemented. With this form of collaboration was possible to deliver a final product closer to the end-user vision.

The project workflow can be seen in figure 10, which facilitates the identification of the process steps.

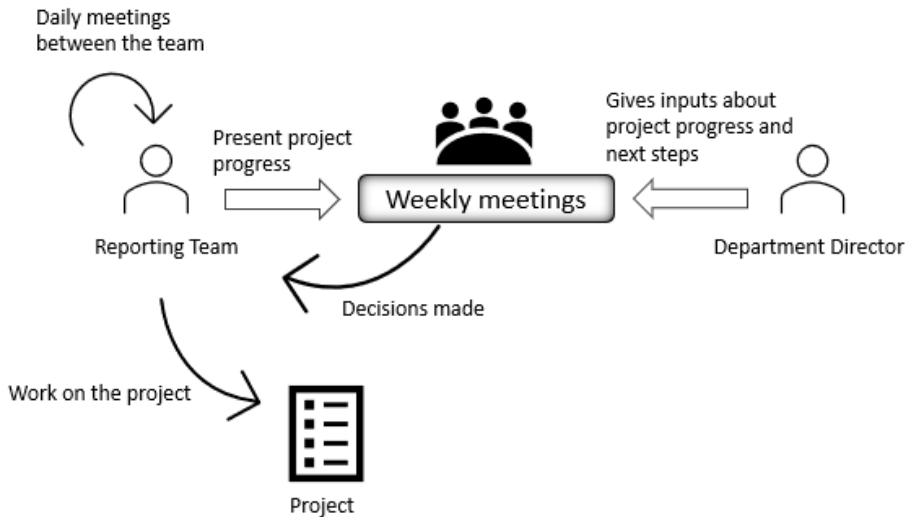


Figure 10 - Project workflow

One of the requirements of the project was that all the sales reports should have the same structure for all channels and that each report, should have different pages by channel hierarchy. Also, that the reports should look like a PDF, so it was possible to extract a PDF when the reports were refreshed with new data and send it to the end-users that did not have access to the Self-Service BI methods. After these decisions, the team started to think about the whole process, starting with the data needed and how to show the information hierarchically in a PDF style.

It was also requested by the director that before starting the development of the reports that two tasks should be completed, a study about the department reports and the development of a reporting browser. These were the first tasks done in this project.

### 4.2.1. Study about the department reports

The first task of this project was to make a study about the reports delivered in the department. For this purpose, a survey was created. With the information gathered in the survey, it was possible to understand how the end-users analyse the reports and if improvements could be made. The survey also had a question about the revamping of the reports, so users could give their opinion on how reports could be improved.

#### 4.2.1.1. Survey

A survey was created in Microsoft Forms and it was sent by email to all employees that made part of the management of each sales channel. The survey was composed of nine questions that were thoughtfully brainstormed in a team meeting with the goal of answering the study objectives described in the introduction of this report.

In figure 11 is possible to see the template of nine questions that were asked on the survey for each report delivered in the department.

The image shows a survey template with 9 questions arranged in two columns. Questions 1, 2, 3, and 4 are on the left; questions 5, 6, 7, 8, and 9 are on the right. Each question is followed by its respective response options or a text input field.

- 1. Com que periodicidade consulta o relatório das Lojas? \*
  - Todos os dias
  - Todas as semanas
  - 1 vez por mês
  - Pontualmente
- 2. Em que formato prefere consultar a informação disponibilizada neste relatório? \*
  - Power BI
  - PDF
  - Print no corpo do email
- 3. Com a informação que é disponibilizada faz alguma análise adicional? \*
  - Não
  - Sim, exporto a informação para fazer outras análises
  - Sim, exporto a informação para guardar histórico
  - Sim, exporto a informação para alimentar outros relatórios
  - Other
- 4. Se sim, que análise(s) adicional(ais) faz?  
Enter your answer
- 5. Este relatório contempla toda a informação que considera necessária? \*
  - Sim
  - Não
- 6. Caso a resposta tenha sido "não", por favor indique que informação considera estar em falta \*  
Enter your answer
- 7. Quanto tempo de histórico acha necessário ser apresentado no relatório? \*
  - Um ano de histórico
  - Dois anos de histórico
  - Três anos de histórico
  - Other
- 8. Encontrando-se a decorrer o processo de revamping dos nossos relatórios, tem alguma sugestão de como gostaria de passar a ver a informação ou o aspeto deste relatório?  
Enter your answer
- 9. Partilhe comentários/sugestões de melhoria que considere relevantes e que não foram abordados sobre este relatório.  
Enter your answer

Figure 11 - Survey template questions for each report

### 4.2.2. Reporting Browser

It was requested by the department director, a reporting browser that would allow the management teams of each channel to easily see which reports they could analyse and a way to facilitate their access to them. In the future, each revamped report will be added to the browser including the ones talked about in this project. To create this browser, Microsoft Power BI was used.

#### 4.2.2.1. Browser restriction access

Multiple reports contain confidential information between channels, so the browser needed to have some type of access restriction. Since there was no easy way to do page restriction inside Microsoft Power BI, it was used a combination of Row-Level Security (RLS) and conditional formatting, in this way it was possible to control which pages could be seen by specific users (Quevauvilliers, 2020). For this reason, a Microsoft Excel file with 3 sheets was created. The first sheet had the names of the pages in the Power BI report and their order, the second a list of all users and their emails and the final sheet contained which pages each user had access to. Figure 12 shows a mockup of all sheets.

A	B
1	Page Name
2	DIREÇÃO
3	LOJAS
4	LOJAS - PSE
5	LOJAS - QA
6	AGENTES
7	AGENTES - REGIÃO
8	AGENTES - GESTOR
9	D2D
10	D2D - GESTOR
11	RAD
12	RAD - GESTOR
13	IMOBILIÁRIAS
14	IMOBILIÁRIAS - GESTOR

Pages Navegador

A	B
1	Email
2	1@edp.pt
3	2@edp.pt
4	3@edp.pt
5	4@edp.pt

Users

A	B	C
1	Page Name	Email
2	DIREÇÃO	1@edp.pt
3	AGENTES	2@edp.pt
4	LOJAS	3@edp.pt
5	AGENTES - GESTOR	4@edp.pt

Pages for Users

Figure 12 - Browser restriction file mockup

After importing the data to Power BI, it was created a small data model and the relationships between the three tables for the RLS to work shown in figure 13.

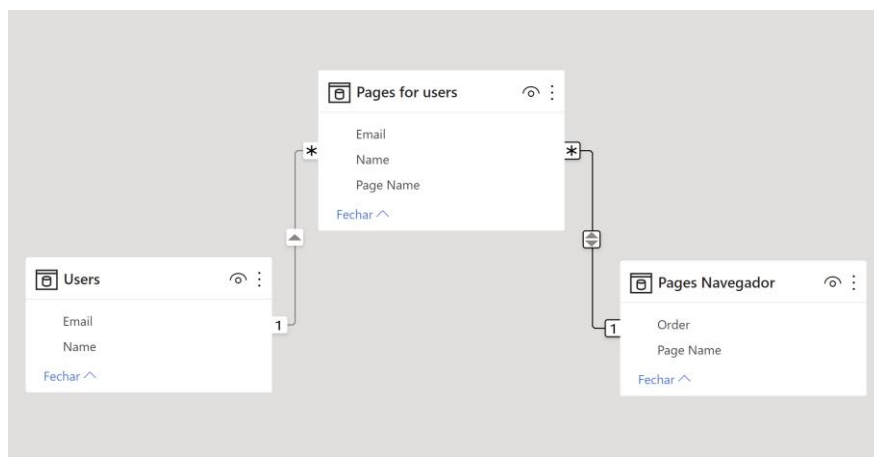


Figure 13 - Restriction data model mockup

The relations between the tables in the model can be seen in figures 14 and 15.

## Users → Pages for users

### Editar relação

Selecione as tabelas e colunas que estão relacionadas.

Pages for users

Page Name	Email	Name
DIREÇÃO	1@edp.pt	person1
AGENTES	2@edp.pt	person2
LOJAS	3@edp.pt	person3

Users

Email	Name
1@edp.pt	Person1
2@edp.pt	Person2
3@edp.pt	Person3

Cardinalidade: Muitos para um (\*:1) | Direção de filtro cruzado: Único

Tornar esta relação ativa |  Aplicar filtros de segurança em ambas as direções  
 Assumir integridade referencial

OK Cancelar

Figure 14 - Relationship between tables [Pages for users] & [Users]

## Pages Navegador → Pages for users

### Editar relação

Selecione as tabelas e colunas que estão relacionadas.

Pages for users

Page Name	Email	Name
DIREÇÃO	1@edp.pt	person1
AGENTES	2@edp.pt	person2
LOJAS	3@edp.pt	person3

Pages Navegador

Page Name	Order
DIREÇÃO	1
LOJAS	2
LOJAS - PSE	3

Cardinalidade: Muitos para um (\*:1) | Direção de filtro cruzado: Ambos

Tornar esta relação ativa |  Aplicar filtros de segurança em ambas as direções  
 Assumir integridade referencial

OK Cancelar

Figure 15 - Relationship between tables [Pages for users] & [Pages Navegador]

After creating the model it was needed to create an RLS profile using the DAX function `UserPrincipalName()`, which returns the users email that is being used. This step translates to whenever a user tries to access the browser online, will only appear the pages that they have access to on the "Pages for users" table. This RLS profile can be created on the Power BI desktop app on the "Modeling" tab and then on "Manage roles" as shown in figure 16.

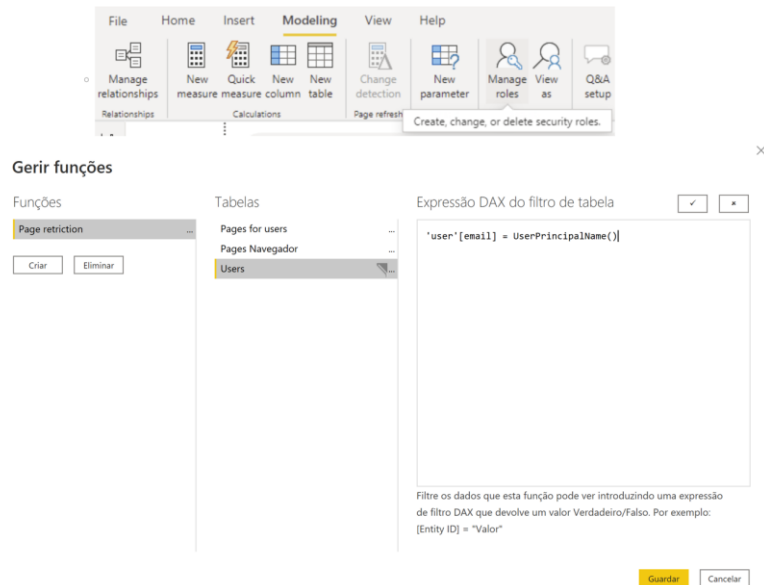


Figure 16 - Creating an RLS profile

After creating the RLS profile was also required to configure it on the Power BI service online. For this reason, in the App Workspace on Power BI service where the browser was published, it was needed to go to the security tab of the data model and add the emails of all users that should have access to it, an example is shown in figure 17.

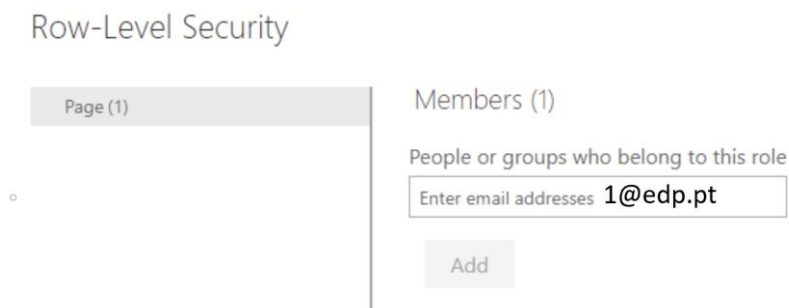


Figure 17 - Adding users to RLS data security on Power BI service

After completing this step each user added to the RLS security should have access to the reporting browser but only to the pages that are assigned to him. This restriction measure will be applied through an internal navigator which will be the front page of the browser.

### 4.3. DATA

The sales data used in this project was provided by an information systems department in the company. Daily, they would share 5 Microsoft Excel files that contained information about each channel's new sales and their details. This data was sent in a raw format that contained many useless columns and data that needed to be transformed. For this reason, an ETL process was needed to

extract the data, perform cleaning, transformation and data augmentation, so it was possible to merge the new information with the historical sales data of each channel by typology, whether it was a sale or a product activation. Also, each month was provided an Excel file with the monthly sales objectives for each product by channel hierarchy. A calendar file was also created so it was possible to use time intelligence metrics on the reports. After transforming the data into the needed format, it will be loaded into data flows inside Power BI service, to finally feed the information to the reports.

### 4.3.1. Data table structure

This next section shows the desired content for each data table in order to create the desired data model.

#### 4.3.1.1. Sales

The sales table will be created by merging the different sales files of each channel after an ETL process is completed. The table essential columns are date, contract\_id, hierarchy\_CRM\_name, sales typology and channel. The figures below show in more detail the data structure wanted with dummy data.

A	B	C	D	E	F	G	H	I	J	K	L
Data	AnoMes	Produto	ID_CONTA	ID_CONTRATO	NomeCRM	User	FlagBronze	FlagComissao	TIPOLOGIA	Potencia	CANAL
20210101	202101	ELETRICIDADE	1,60805E+11	11111	LOJA1	11111	0	0	ATV	3.45	LOJAS
20210101	202101	Gás	1,60804E+11	22222	LOJA2	22222	0	0	ANG		LOJAS

Figure 18 - Stores sales table

A	B	C	D	E	F	G	H	I	J	K	L
Data	AnoMes	Produto	ID_CONTA	ID_CONTRATO	NomeCRM	User	FlagBronze	FlagComissao	TIPOLOGIA	Potencia	CANAL
20210101	202101	DÉBITO DIRETO	1,6E+11		AGENTE 1	11111	0		ANG		AGENTES
20210101	202101	CONTA CERTA	1,6E+11		AGENTE 2	22222	0	1	ATV		AGENTES

Figure 19 - Agents sales table

A	B	C	D	E	F	G	H	I	J	K	L
Data	AnoMes	Produto	ID_CONTA	ID_CONTRATO	NomeCRM	User	FlagBronze	FlagComissao	TIPOLOGIA	Potencia	CANAL
20210101	202101	SOLAR	1,61E+11	1111	D2D1	11111	0		ANG		D2D
20210101	202101	ELETRICIDADE	1,61E+11	2222	D2D2	22222	0	1	ATV	3.45	D2D

Figure 20 - D2D sales table

A	B	C	D	E	F	G	H	I	J	K	L
Data	AnoMes	Produto	ID_CONTA	ID_CONTR.	NomeCRM	User	FlagBronze	FlagComissao	TIPOLOGIA	Potencia	CANAL
20210101	202101	ELETRICIDADE	1,61E+11	1111	RAD1	11111	1	0	ATV	20,7	RAD
20210101	202101	SOLAR	1,61E+11	2222	RAD2	22222	0	1	ANG		RAD

Figure 21 - RAD sales table

A	B	C	D	E	F	G	H	I	J	K
Data	AnoMes	Produto	ID_CONTA	ID_CONTR	NomeCRM	User	FlagBronze	FlagComissao	TIPOLOGIA	CANAL
20210104	202101	CERTIFICAÇÃO ENERGÉTICA	1,61E+11	1111	IMOB1	1111	0	1	ATV	IMOBILIÁRIAS
20210104	202101	CERTIFICAÇÃO ENERGÉTICA	1,61E+11	2222	IMOB2	2222	0	0	ANG	IMOBILIÁRIAS

Figure 22 - Real estate sales table

#### 4.3.1.2. Sales Objectives

The sales objectives table is refreshed monthly, it contains data about the monthly sales objectives by sale typology (sales or product activations), product, channel and hierarchy.

A	B	C	D	E	F	G	H	I	J	K	L	M
ANOMES	REGIAO	CANAL	PSE	NOME_CRM	NOME_INLINE	DISTRITO	GESTOR	CLUSTER	BRONZE	PRODUTO	OBJ_ATIV	OBJ_ANG
201901	LOJAS	Prestador1	LOJA1		Albufeira	Faro	Gestor1	Loja Própria	0	ELETRICIDADE	1111	1111
201901	LOJAS	Prestador2	LOJA2		Porto	Porto	Gestor2	Loja Própria	0	GÁS	2222	2222
201901	AGENTES		AGENTES1		Lisboa	Lisbos	Gestor3	Exclusivo	0	FATURA ELETRÓNICA	3333	3333

Figure 23 - Sales objectives table

#### 4.3.1.3. Calendar

A calendar table was created in Microsoft Excel to add a date dimension to the data model. It was also needed to have metrics by working days, so it was added to the calendar a column "flag\_workingday" to provide this information. The calendar is divided by channel, so it is possible to change the flag\_working\_day for any day, whenever it is requested by a channel. Figure 24 shows the template for the calendar table.

	A	B	C	D	E	F	G	H	I	J	K
1	CANAL	Chave	Data M	Anomês	Data	Start Date M	FlagWorkDay	Workdays	Data M-1	Start Date M-1	Workdays M-1
34	AGENTES	2020_2_0_AGENTES	02/02/2020	202002	20200202	01/02/2020	0	0	01/01/2020	01/01/2020	0
35	AGENTES	2020_2_1_AGENTES	03/02/2020	202002	20200203	01/02/2020	1	1	02/01/2020	01/01/2020	1
36	AGENTES	2020_2_2_AGENTES	04/02/2020	202002	20200204	01/02/2020	1	2	03/01/2020	01/01/2020	2
37	AGENTES	2020_2_3_AGENTES	05/02/2020	202002	20200205	01/02/2020	1	3	06/01/2020	01/01/2020	3
38	AGENTES	2020_2_4_AGENTES	06/02/2020	202002	20200206	01/02/2020	1	4	07/01/2020	01/01/2020	4

Figure 24 - Calendar table

#### 4.4. DIMENSIONAL MODEL MOCKUP

The dimensional model for all the reports will be generic, it will consist of two fact tables (Sales and Sales Objectives) and five dimensional tables (Calendar, CRM, Commission, Bronze and Products) that will provide information and details about the events in the fact tables.

Figure 25 shows the dimensional model mockup and the relationships between the fact tables and the dimensional ones, as both fact tables will be connected to the same dimension tables this will result in a Constellation Schema.

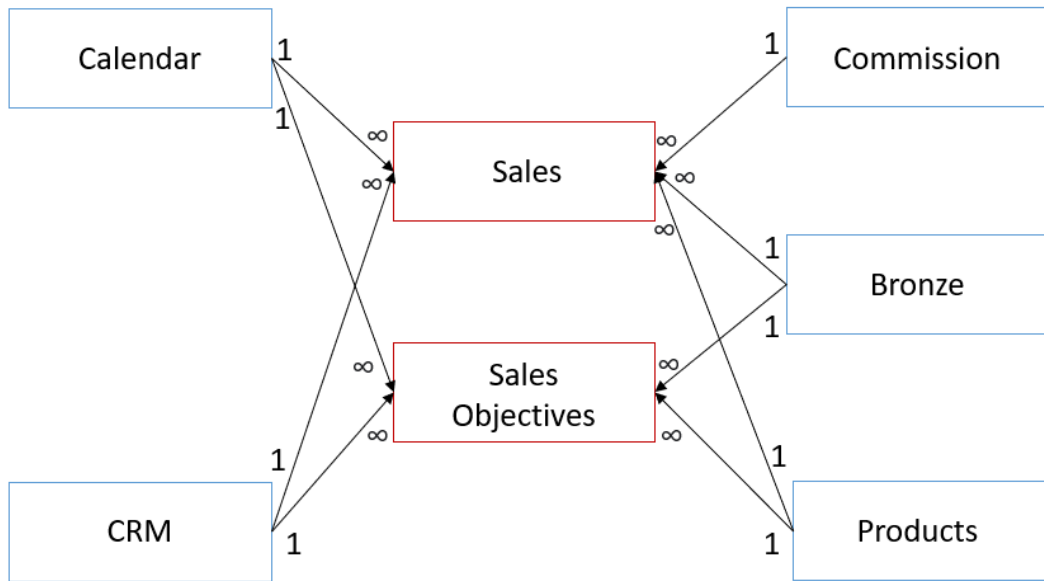


Figure 25 - Dimensional model mockup

#### 4.5. DIMENSION TABLES

- Dim\_Calendar: A Microsoft Excel file created according to the Portuguese holiday calendar with working days by channel;
- Dim\_Comission: Table with a binary column flag to distinguish if a sale is eligible or not for commissioning;
- Dim\_Bronze: Table with a binary column flag to distinguish B2C sales from B2B bronze sales;
- Dim\_CRM: Table with specific columns from the sales objectives table about detailed information on Customer Relationship Management;
- Dim\_Products: Table with all the products available.

#### 4.6. FACT TABLES

- Fact\_Sales: Table with information about all the sales made by typology if it is a sale or a product activation and all the information associated with that sale;
- Fact\_Sales\_Objectives: Table with monthly sales objectives by product and channel hierarchy.

#### 4.7. METRICS AND KPIS

- Sales (Angariações): Count of all sales in the sales table by typology "ANG";
- Product Activations (Ativações): Count of all sales in the sales table by typology "ATV";
- Monthly Sales Objective: Sum of the column "OBJ\_ANG" in the sales objectives table;
- Monthly Product Activations Objective: Sum of the column "OBJ\_ATV" in the sales objectives table;
- Monthly Sales Objective Done (%): Sales / Monthly Sales Objective \* 100;
- Monthly Product Activation Objective Done (%): Product Activations / Monthly Product Activations Objective \* 100;



- Working Days: Count of the days in the calendar table that have "Flag\_workingday" = 1, for a certain period;
- Monthly Total Working Days: Count of the days in the calendar table that have "Flag\_workingday" = 1, for a certain month;
- Sales Tendency: Sum of the Sales done to date in a certain month by typology / Working Days to date in a month \* Monthly Total Working Days;
- Monthly Productivity per Working day: Count of all sales by typology in the sales table / Working days to date;
- Sales Productivity per Working Day M vs M-1 (%): (Count of all sales in the sales table by typology for the current month / Monthly Total Working Days) / (Count of all sales in the sales table by typology for the previous month / previous Month Total Working Days) \*100.

#### **4.8. CONCEPTUAL REPORTS**

The end goal of this project was to build reports that contained the same metrics and KPIs about the sales done by channel and by each hierarchy. Since a sale is divided into two moments, the sale itself and later the activation or not of the product sold, it was also requested that the analysis of these two typologies, were split into different report pages. There was also interest in looking at these metrics from a month-to-date perspective (MTD) and a year-to-date (YTD) one. Having this in thought it was planned to create six Microsoft Power BI reports, one for each sales channel and one for the department director to see the insights of the sales done by all channels. Each channel report will contain four pages for each hierarchy.

- MTD Sales
- MTD Product Activations
- YTD Sales
- YTD Product Activations

To make sure each channel hierarchy can only visualise its own pages, the only way to access the pages of the reports is by accessing through the reporting browser, making it an access restriction tool to make sure every user is only accessing what they can really analyse. This way no confidential information is leaked.

The management also requested that the report pages should look like a PDF sheet and that each page could be filtered for each member of a certain channel hierarchy, so every user would receive a PDF with their information about the sales and product activations made, especially the lowest hierarchy levels, that don't have access to Power BI service, so the only way they can analyse this information it will be by extracting a PDF of the pages filtered for them and send it by email. This situation led to the report pages being extremely large and hard to deal with.

##### **4.8.1. MTD sales report**

The management MTD sales report pages (Appendix 1) will have three sections that are represented by a black pill shape. An executive vision where it is possible to see for each product a KPI that has the monthly sales objective done (%) and below, the sales productivity per working day M vs M-1 (%). A product vision, that has several tables that show the metrics monthly sales objective, sales made, monthly product sales tendency, the monthly sales objective done (%) and sales productivity M vs M-

1 (%). Each table is filtered by product and hierarchy. The final section is the daily vision which is a larger table that shows sales by product, hierarchy and by day.

#### **4.8.2. YTD sales report**

The management YTD sales report pages (Appendix 2) will also have three sections that are represented by black pill shapes. An executive vision, that for each product will have a bar plot with the number of sales made for each month for the selected year. Next is a product vision that contains three tables. The first table shows for each month of the year, the number of sales made and the % of the monthly sales objective completed. The second shows the monthly sales objective by month and the final one contains the monthly sales productivity per working day.

The final section is an evolving vision that contains two larger tables. The first one is filtered by month, product and hierarchy. For each month it shows the sales objective, the sales made, and the % of sales objective completed. The second table is filtered by month, product and hierarchy as well, but shows the sales productivity per working day M vs M-1 (%) and the monthly sales productivity also per working day.

## 5. RESULTS

### 5.1. SURVEY RESULTS

This section presents general insights into the answers given in the survey. The survey results were separated into multiple-choice questions and open questions.

Starting with the first objective proposed, from all the reports delivered in the department, it was found that one was not being analysed. Therefore, it was discontinued. Also, 37% of all reports were analysed weekly, 31% daily and the rest with a period higher than a week. With this information, it was possible to determine for each report the data refresh period needed.

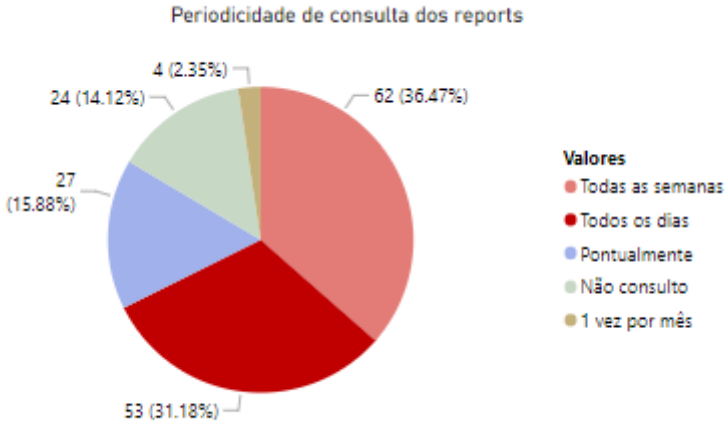


Figure 26 - Users' answers about the frequency of report analysis

For the second objective, the users were asked how they prefer to analyse each report. Of the responses, 82% were Self-Service PBI, 11% would like to receive the reports in PDF and the rest a print screen of the report via email.

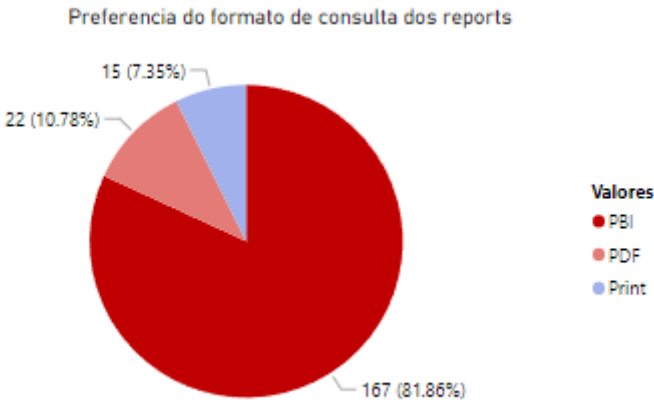


Figure 27 - Users' format preference when analysing the reports delivered

For the third objective, it was asked for each report if the end-users would make any additional analysis. About 65% of the answers were that additional analysis was not being done for the reports analysed. With the rest of the answers being that additional analysis was being done.



Figure 28 - Users answers to if it is made an additional analysis on the reports they analyse

For the last objective and most important for this project, the users were asked about the incoming changes and if they had any ideas and suggestions for the rebranding project. The questions asked were open questions and they were free to give their opinions and write what they wanted to see. With the answers given, it was possible to understand for the reports talked about in this project which metrics they wanted to see and how the users expected the reports to look. From the answers, it was also possible to get the sense that the majority was on board with the project and that they were excited.

The overall survey answers helped to gain knowledge about the utilization of the reports and the reporting system, giving good insights that were used to develop the new reports.

**5.2. BROWSER LOOK AND FEEL**

The report browser had the objective of being a report menu for each channel by hierarchy, which would facilitate their access to the reports. It starts with a front cover that works as an internal navigator page. It contains a filter with all the page names, which will work as an access restriction measure, so when each user tries to access the browser, will only appear the pages that the user has access to on a filter. The front cover can be seen in figure 29.



Figure 29 - Front cover of the reporting browser that serves as an internal navigator

In figure 30 it is possible to see an example of a report menu page for the management ("DIREÇÃO"), each page will have the name of the channel-hierarchy on the top of the page and it will have an arrow button to retrieve to the front cover.

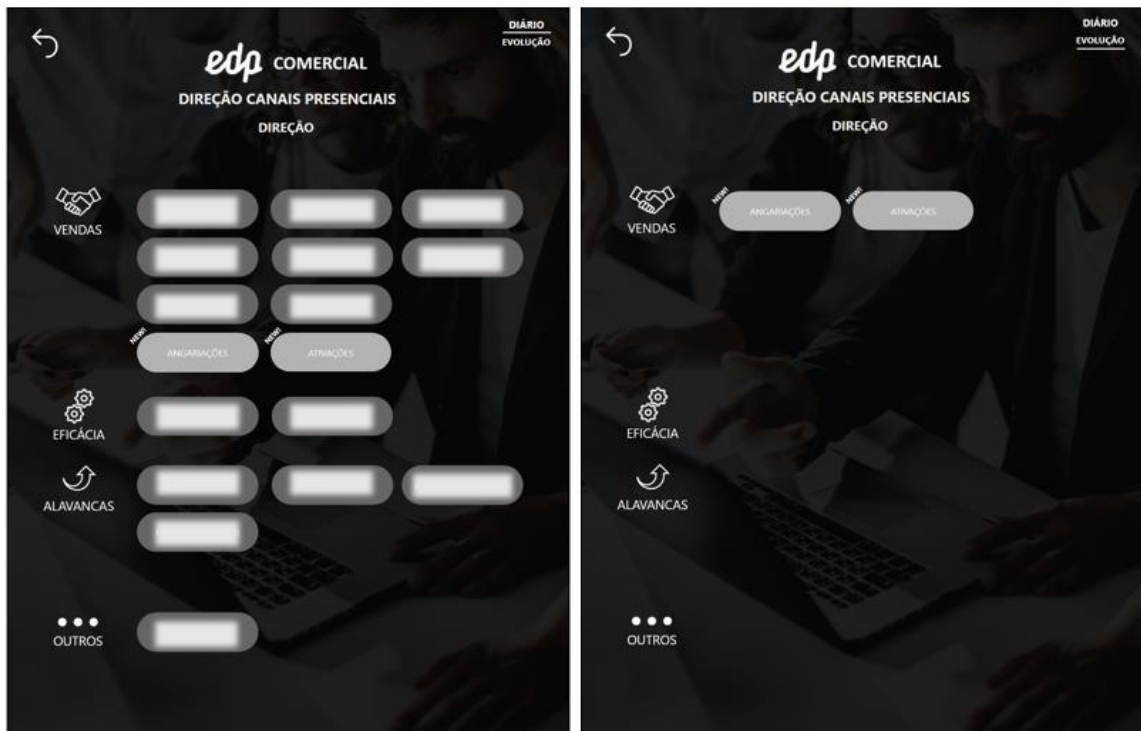


Figure 30 - Management report page menu

The menu will have different buttons each one being a report available to analyse, they are divided by business sections and to access each report is only needed to click on the desired button and a web browser page will appear with the report open. In figure 30, the names of the reports are blurred for confidentiality reasons, it is possible to see the light grey buttons with the label "new" on the top left corner, which are the two new rebranded reports talked about on this project. Since the new reports will have a month-to-date and a year-to-date version, the menu has on the top right a button to switch from MTD to YTD, which is the difference between the left picture and the right one in figure 30.

To better understand the full process of navigating in the report browser, figure 31 shows a three-step use case for an employee that has access to the management and stores menu, where he chooses to click on the management page and access the report "Angariações" MTD which is one of the new rebranded reports in a light grey color.

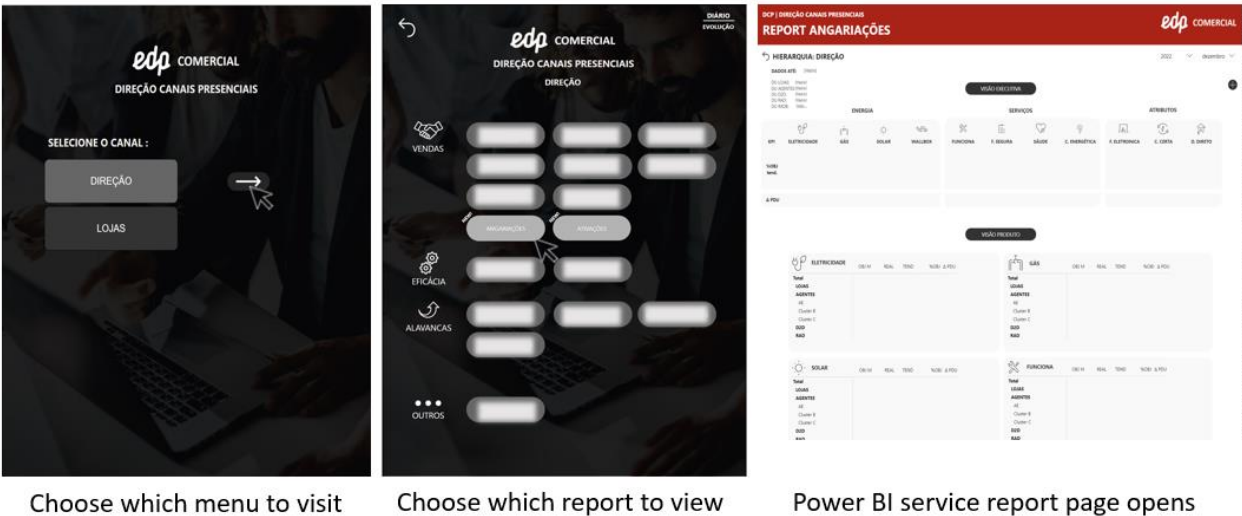


Figure 31 - Use case of the report browser

### 5.3. SALES DATA TRANSFORMATION

The sales data used in this project, as said before is provided daily by an information system department in the company, they provide five Microsoft Excel files with raw data about the daily sales of each channel. The raw data has about 76 columns of information, which means it has a lot of useless information and data that needs to be transformed.

Some of the issues with the raw sales data were:

- Columns that did not provide any value;
- Wrong product names;
- Wrong point of sale names;
- Duplicated information;
- Data that needed to be transformed by creating business rules.

To get the desired data format, my Business Intelligence work colleague, created an ETL process for each channel's sales data. For the development of this process, it was used the software Statistical Analysis System (SAS).

This process takes as inputs three different Microsoft Excel files, the first one is the raw sales data, the second, is a file that contained information that needed to be merged with the sales file and the last one was the monthly sales objectives file that contained useful information for data mapping and standardising data definitions.

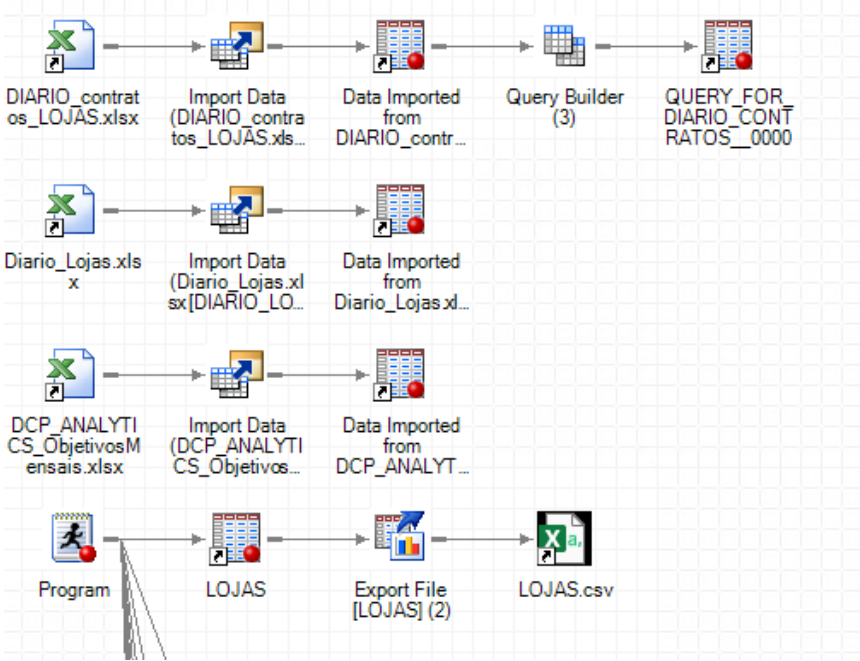


Figure 32 - Process flow inside SAS for the store's sales data

After loading the data into SAS, it followed the creation of the transformation project that in this case, inside SAS is called a program (see figure 32). The program has multiple steps inside to accomplish our end data goals. Through coding it was possible to create multiple temporary data tables that were used to make queries, join tables and create business rules to transform the sales data into the desired output. Some of the transformations made were the standardisation of product, point of sales and sales agent's names by associating the wrong values to the correct ones, merging multiple tables in order to have a more augmented dataset, removing duplicated entries, excluding columns that had no value for the final result and utilising business rules to transform the raw data into the data needed to create the reports.

Some of these steps could have been done in the Power Query Editor inside Power BI desktop, but instead to save computation time and to have a better performance on the reports they were included in the transformation process in SAS.

**5.4. DATA FLOWS**

After completing the ETL process for the sales data of each channel and having the data in the wanted format shown in section 4.3.1, it was time to load the data into Power BI to create the data model. Unfortunately, there was an issue affecting the current reports refresh. Most of the reports needed to

be refreshed daily, but they were taking a long time because the data was being loaded through Excel files in a SharePoint and multiple reports were loading the same files, causing it to take a more extensive time. To fix this problem for the new reports, it was created data flows in Power BI Service for each data table that could function as a data warehouse. This way only the dataflows needed to be refreshed daily to feed all the new reports using the same data tables. Making the refresh time for the reports a lot faster and the same tables of information could be loaded to different reports more practically, for the new report and future ones.

Figure 33 shows the 7 data flows created. One for each channel sales table, one for the monthly sales objectives data and the last one for the calendar file. The sales data is refreshed daily, while the objective one is done monthly and the calendar has yearly updates.

	Tudo	Conteúdo	Conjuntos de dados + fluxos de dados
Tipo: Fluxo de dados X Limpar tudo			
Nome	Tipo		
Vendas Agentes	Fluxo de dados		
Vendas D2D	Fluxo de dados		
Vendas Imobiliarias	Fluxo de dados		
Vendas Lojas	Fluxo de dados		
Vendas RAD	Fluxo de dados		
ObjetivosMensais+CRM	Fluxo de dados		
Calendário	Fluxo de dados		

Figure 33 - Data flows inside Power BI service

**5.5. DATA MODEL**

After loading the data from the dataflows to the Power BI desktop, a generic data model was created to be used in all the reports. This model is a constellation schema with 2 fact tables and 7 dimensional tables as it is shown in figure 34.



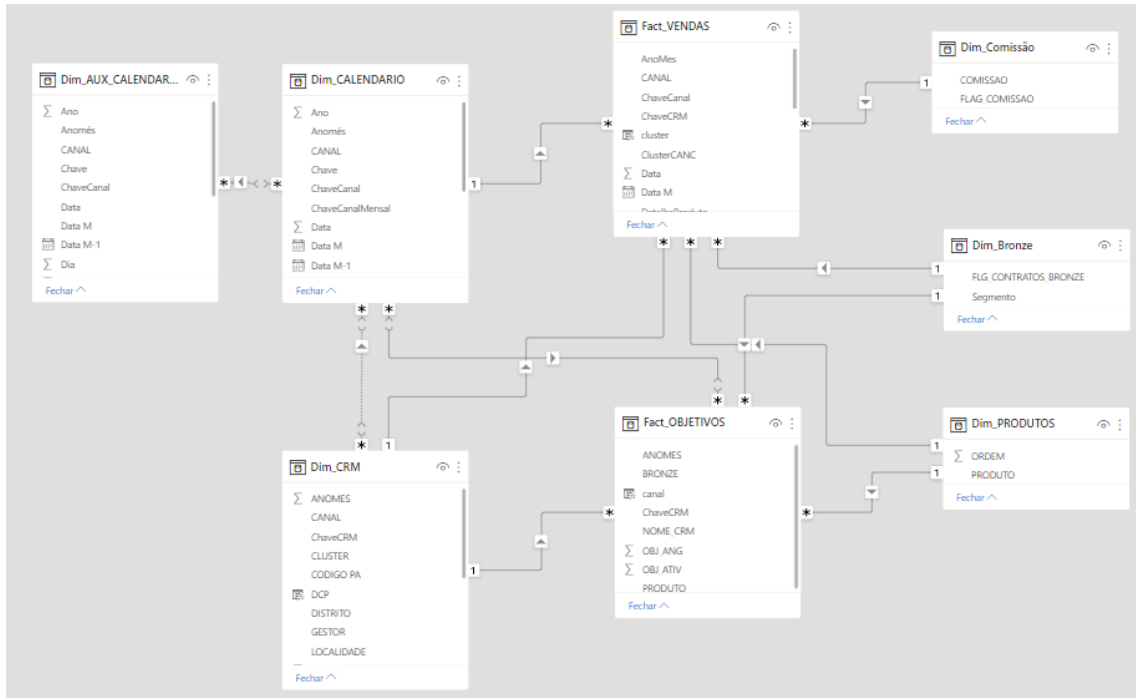


Figure 34 - Data model inside Power BI

It was also very important to establish the relationships between the fact tables and the dimension ones. Figure 35 shows the relationships between the fact and dimension tables of the model.

Ativa	De: Tabela (Coluna)	Para: Tabela (Coluna)
<input checked="" type="checkbox"/>	Dim_AUX_CALENDARIO (Data M)	Dim_CALENDARIO (Data M)
<input type="checkbox"/>	Dim_CALENDARIO (CANAL)	Dim_CRM (CANAL)
<input checked="" type="checkbox"/>	Fact_OBJETIVOS (ANOMES)	Dim_CALENDARIO (Anomês)
<input checked="" type="checkbox"/>	Fact_OBJETIVOS (BRONZE)	Dim_Bronze (FLG_CONTRATOS_BRONZE)
<input checked="" type="checkbox"/>	Fact_OBJETIVOS (ChaveCRM)	Dim_CRM (ChaveCRM)
<input checked="" type="checkbox"/>	Fact_OBJETIVOS (PRODUTO)	Dim_PRODUTOS (PRODUTO)
<input checked="" type="checkbox"/>	Fact_VENDAS (ChaveCanal)	Dim_CALENDARIO (ChaveCanal)
<input checked="" type="checkbox"/>	Fact_VENDAS (ChaveCRM)	Dim_CRM (ChaveCRM)
<input checked="" type="checkbox"/>	Fact_VENDAS (FlagBronze)	Dim_Bronze (FLG_CONTRATOS_BRONZE)
<input checked="" type="checkbox"/>	Fact_VENDAS (FlagComissao)	Dim_Comissão (FLAG_COMISSAO)
<input checked="" type="checkbox"/>	Fact_VENDAS (Produto)	Dim_PRODUTOS (PRODUTO)

Figure 35 - Data model relationships

## 5.6. REPORTS

In this section, it is explained in depth the report pages and metrics made to provide information about the sales and product activations to the management teams of each channel.

The project was divided into six reports, one for each sales channel and one for the department director, that showed a summary of the sales information of all channels. Each channel report has four report pages by hierarchy, MTD sales, YTD sales, MTD product activations and YTD product activations.

This section shows an example in depth of two of those report pages, (MTD Sales and YTD sales). The example shows the sales report pages for the store's sub-director hierarchy.

As it was said in the conceptual reports section, one of the requirements for the reports was that the pages needed to look like a PDF, so it was possible to filter the pages for each manager, service provider, point of sale and user, with the goal of at every data refresh, a PDF was exported and sent by email to every user. This request made the pages very large and sometimes hard to deal with. Every page contains 3 sections, and each section has a different purpose with different metrics/KPIs so the information can be better analysed. Each section of the report pages will be shown, the metrics that each contains and their objective. Also, the information on the reports is confidential so it will be shown blurred, a fictitious example of data in every visualisation will be available, so it is easier to visualise the final product. No real information is shown.

### 5.6.1. MTD Sales Page

The MTD sales page objective is to provide information and insights about the sales done in a specific month, for this purpose multiple metrics were created inside Power BI using the programming language DAX (Data Analysis Expressions). The metrics/KPIs will help the end-users analyse how the month is going in terms of the number of sales made, sales objectives done and assist to understand if something in the business is failing and act on it.

Figure 36 shows the cover of the MTD sales page for the store's sub-director hierarchy. The cover has information about the typology of this report page, which is sales ("ANGARIAÇÕES"). It also shows to which hierarchy this page belongs, that in this case is the sub-director, which is the highest hierarchy for the store's channel, so it just says "LOJAS". It gives information about till which day of the month there is data available and the number of working days of the month till that day. Filters were created to help perform a more focused analysis, the filters are year, month, manager, service provider and point of sales. Also, there is a black button with a white plus sign that contain hidden filters, the users can click on the button and filter the sales data by "commissioning" whether the sales can be commissioned or not and by "bronze" if sales belong to B2C or B2B bronze.



Figure 36 - MTD sales page cover

Figure 37 shows the first of three sections that the report page has. This is the executive vision and has the objective to provide a fast read on how the sales are going for each one of the products for the month chosen. As it is possible to see there are 11 donut charts and inside each chart, there is a percentage that corresponds to the % monthly objective sales done. The chart turns green if the sales for that product surpasses the objective and it turns red if the total sales for that product still did not achieve the sales objective. Below each donut chart is possible to see another percentage, which is the % sales productivity per working day M vs M-1. This percentage gives information on how the sales

are going this month per working day compared to the last month and it is green if this month's performance is better than the last month otherwise takes the colour red.



Figure 37 - MTD sales page executive vision

Figure 38 shows the second section of the report page, which is the product vision. This section has one table per product, it is a summary of the progress of the sales done by the hierarchy that is right below the hierarchy that the page is designed for. In this example, since this page is for the sub-director of the stores, it is going to be information about the hierarchy below which are the managers. Each table has 5 measures, the first one being the monthly sales objective for each manager, followed by the number of sales done, the monthly sales tendency per working day, the % monthly sales objective done and the last is the % productivity of sales done per working day of the month compared with the previous one, that also takes the colour green or red to visually aid if the current month is better or not in terms of sales productivity than the last one.

VISÃO PRODUTO

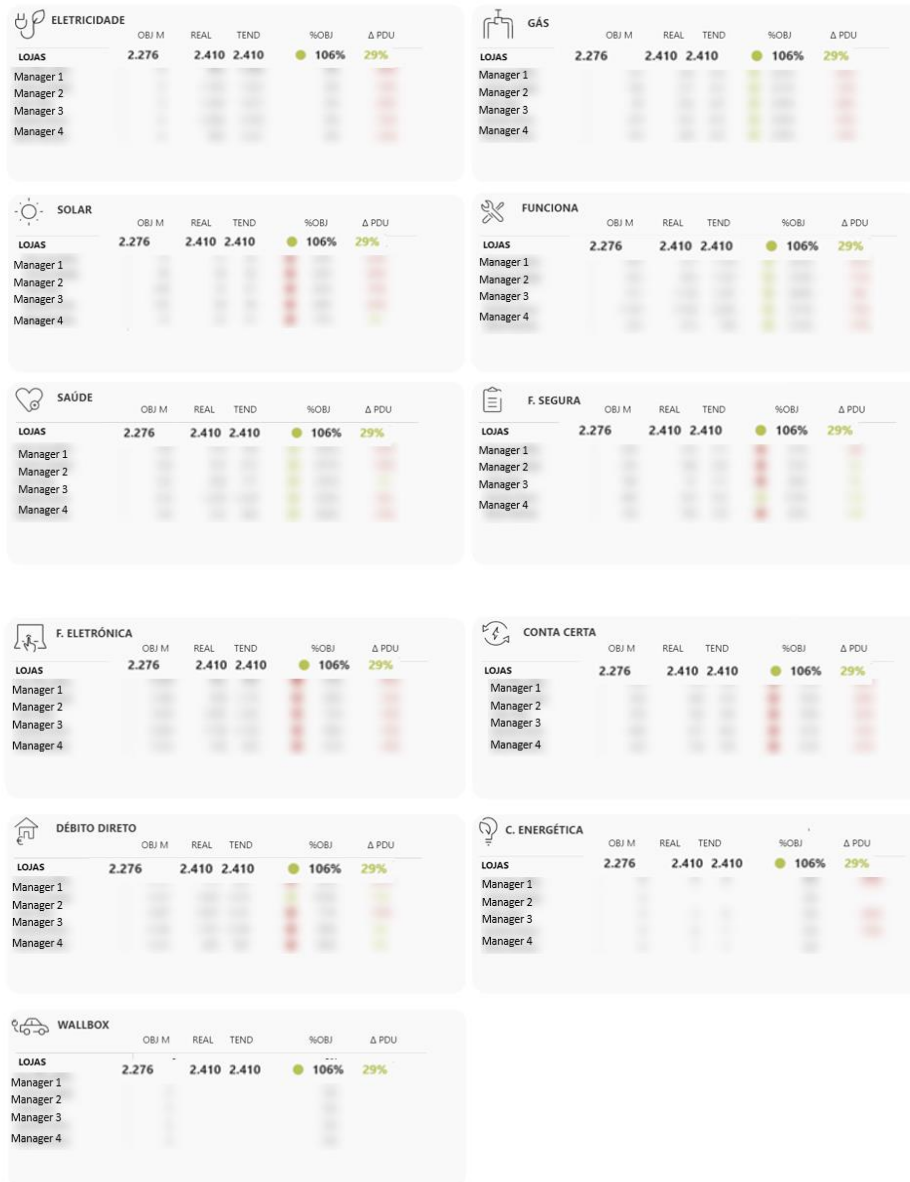


Figure 38 - MTD sales page product vision

Figure 39 shows the last section of the MTD sales report page. The objective of this section is to have information about the daily product sales by hierarchy for the selected month. It is composed of 2 tables, the first one has the product names, hierarchy and 3 metric columns. The first metric is the sales needed by each working day of the month to accomplish the sales objective set. The second is the mean of sales done per working day of the month to date and the third is the number of sales required by working days left in the month to reach the sales objective. The second table has the days of each month as columns and it shows the number of sales done by each day and the current total, filtered by product and hierarchy. On some days, the sales are red because the number of sales done was less than the number of sales needed per working day to accomplish the monthly sales objective.

VISÃO DIÁRIA

VISÃO GESTÃO
VISÃO PONTO DE VENDA
VISÃO USER

PRODUTO	Obj DU	Méda DU	Obj Nec. DU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
ELETRICIDADE	62	54	96	58	44	45	34	44	1	67	57	39	47	41					63	54	67	45	29				96	74	62					945	
Manager 1																																			
Manager 2																																			
Manager 3																																			
Manager 4																																			
SOLAR	62	54	96	58	44	45	34	44	1	67	57	39	47	41					63	54	67	45	29				96	74	62					945	
Manager 1																																			
Manager 2																																			
Manager 3																																			
Manager 4																																			
GÁS	62	54	96	58	44	45	34	44	1	67	57	39	47	41					63	54	67	45	29				96	74	62					945	
Manager 1																																			
Manager 2																																			
Manager 3																																			
Manager 4																																			
FUNCIÓNA	62	54	96	58	44	45	34	44	1	67	57	39	47	41					63	54	67	45	29				96	74	62					945	
Manager 1																																			
Manager 2																																			
Manager 3																																			
Manager 4																																			
SAÚDE	62	54	96	58	44	45	34	44	1	67	57	39	47	41					63	54	67	45	29				96	74	62					945	
Manager 1																																			
Manager 2																																			
Manager 3																																			
Manager 4																																			
FATURA SEGURA	62	54	96	58	44	45	34	44	1	67	57	39	47	41					63	54	67	45	29				96	74	62					945	
Manager 1																																			
Manager 2																																			
Manager 3																																			
Manager 4																																			

Figure 39 - MTD sales page daily vision

In figure 39 is possible to see 3 buttons above both tables, those buttons are different visions created with bookmarks, meaning that in this section it is also possible to see the tables of all hierarchies below if desired. In this case, the sub-director has access to all available tables (managers, points of sale and users) since is the highest hierarchy of the channel. The different tables have the same metrics, the only thing that differs is the hierarchy information.

Figure 40 shows the vision of the points of sale hierarchy. It is possible to change visions by clicking on the buttons, the vision chosen is then highlighted by a black shape.

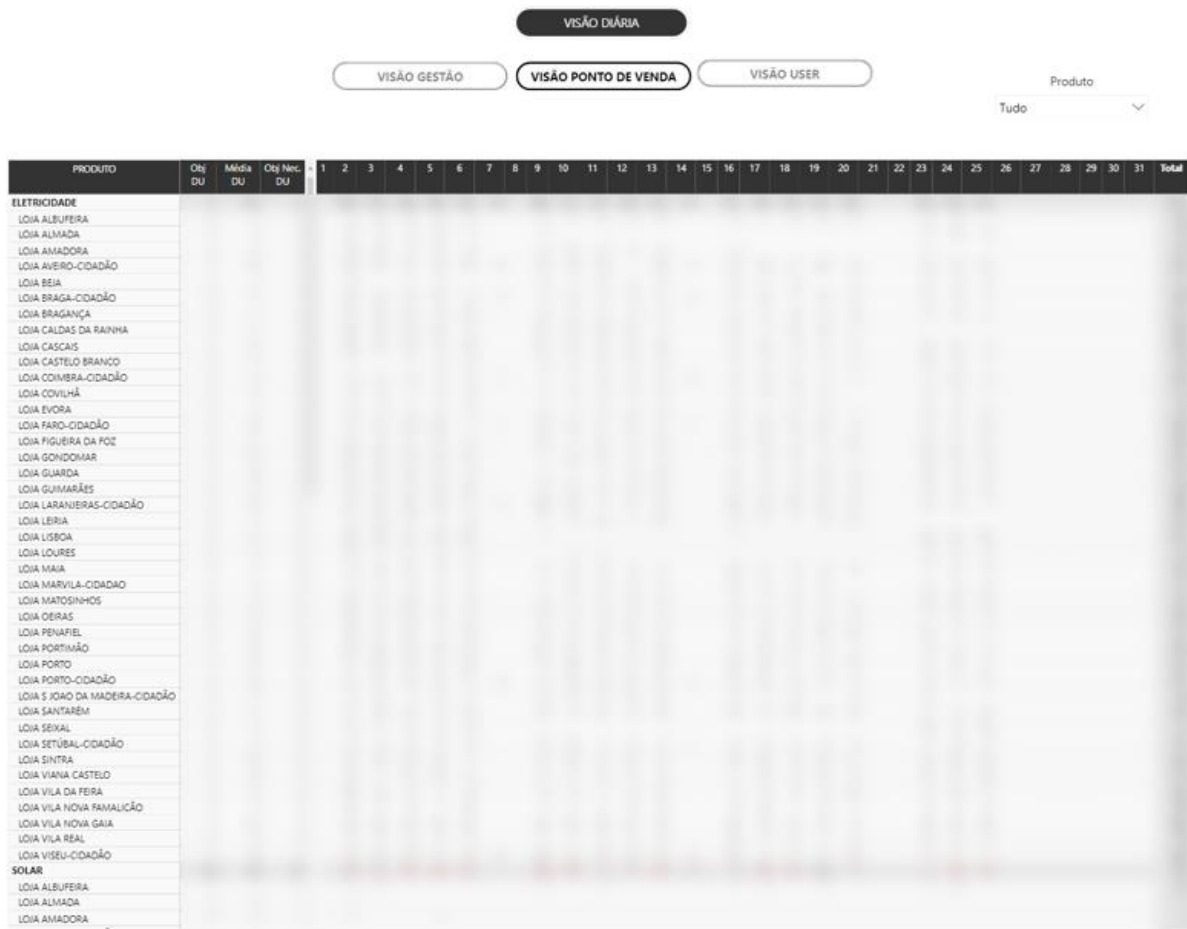


Figure 40 - MTD Sales Stores Point of sale vision

### 5.6.2. YTD Sales Page

The YTD sales page goal is to give information about the progress of the yearly sales by month. The visualisations and metrics will help the end-users analyse if there are significant differences between the number of sales between months, and if so, where is the business failing and what needs to improve.

The YTD report pages like the MTD ones also have 3 different sections, figure 41 shows the front cover of the YTD sales report page for the sub-director of the stores and the first section which is an executive vision. This section has a bar plot for each product and contains 2 different measures, the number of sales done by month, which are the grey bars and the monthly sales objective which are the red horizontal bars. This vision has the goal to give a quick perception of how the sales are evolving through the year and if the objectives of each month are being accomplished for each product.

HIERARQUIA: LOJAS  
 DADOS ATÉ: 31-12-2021

Ano: 2021 | Gestor: Tudo | PSE: Tudo | PA: Tudo

**VISÃO EXECUTIVA**  
 # ANGARIAÇÕES VS OBJETIVO

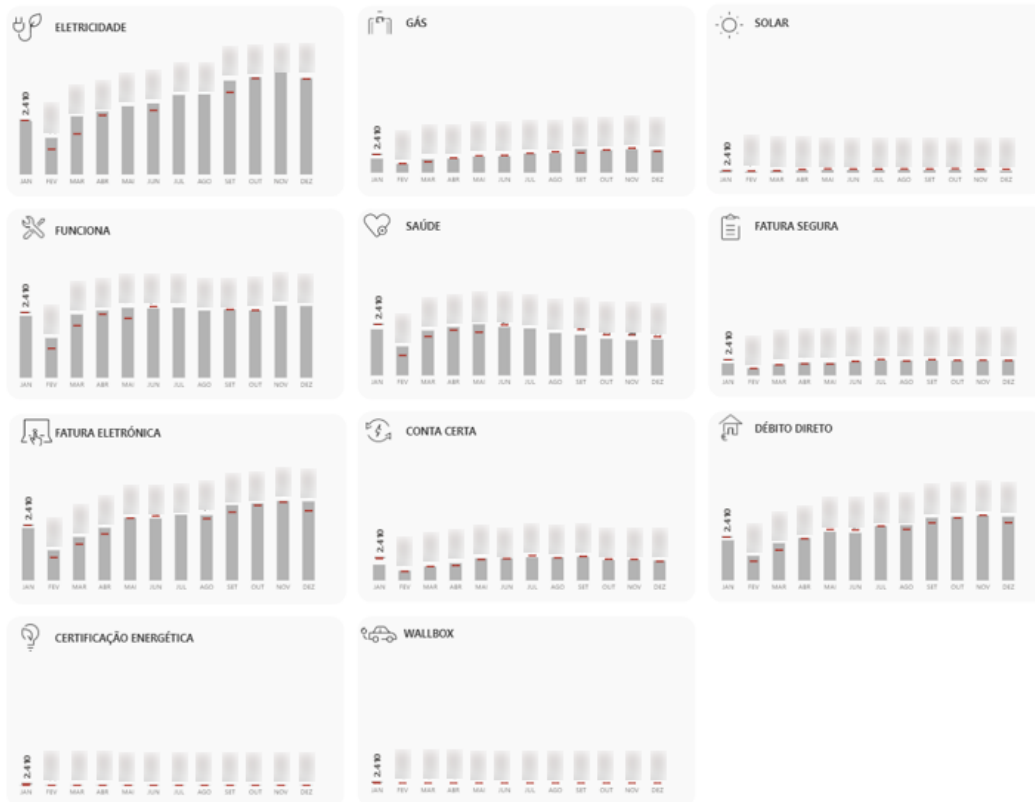


Figure 41 - YTD sales page front cover and executive vision

Figure 42 shows the next section, which is a product vision, this vision complements the information of the first section with more detailed information about the progress of the monthly sales. The visions contain 3 tables. The first one shows the total sales made by month for each product and the % of the monthly sales objective done, this last measure takes the colour green if the monthly sales objective was completed, and red if was not. The second table shows the sales objectives by month and product. The last table shows the monthly sales productivity per working day.

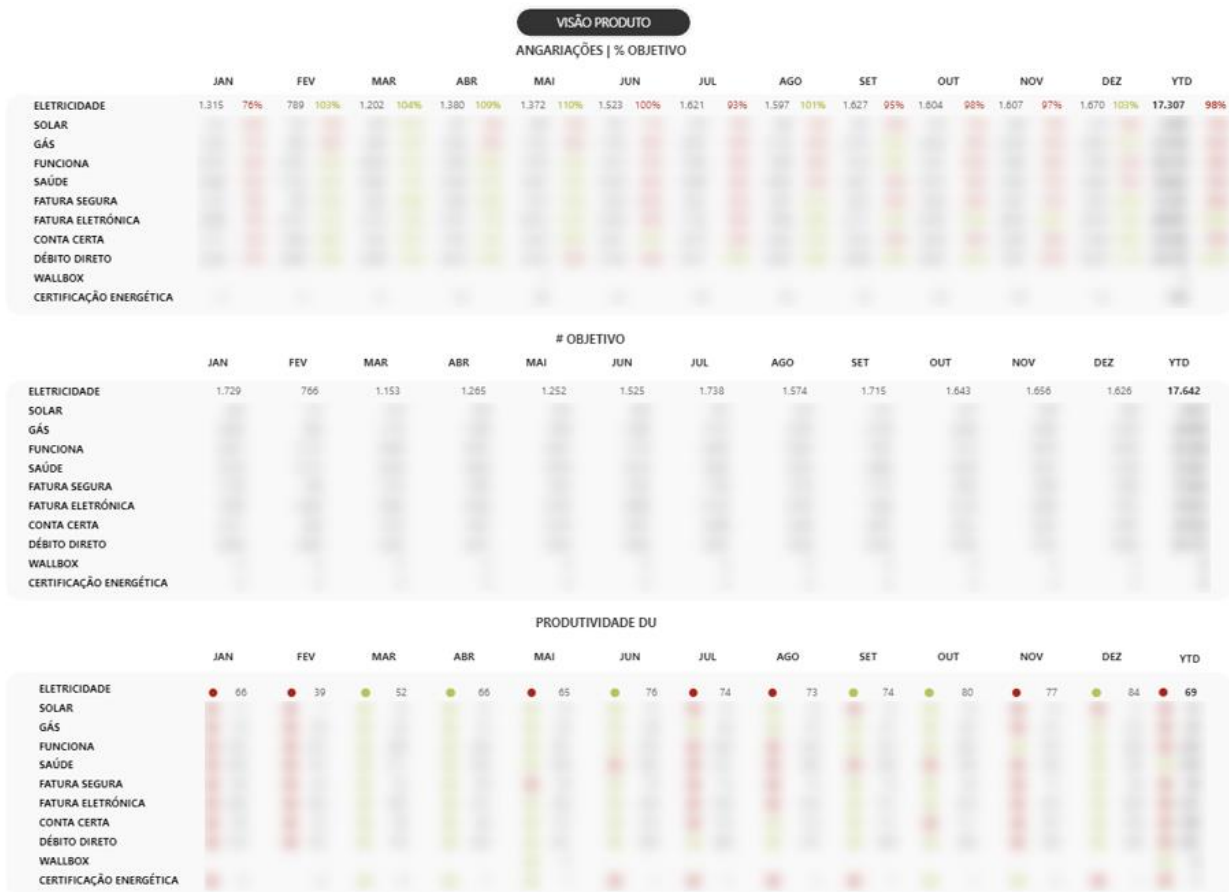


Figure 42 - YTD sales product vision

The last section of the YTD sales page is an evolution vision, this vision's main goal is to provide information on the monthly sales progress having a drill-down to the hierarchy. Like on the MTD report pages, three buttons give the possibility to change the information on this vision to a hierarchy below. This section contains two big tables, both tables show information by month, product and a drill-down to the respective hierarchy, in this case, the managers.

Figure 43 shows the first table. For each month column, there are three different metrics. The first is the monthly sales objective, the second is the total sales made and the last metric is the % of the monthly sales objective completed. There is also a total column that shows the total for all metrics for the selected year.



VISÃO EVOLUÇÃO

VISÃO GESTÃO
VISÃO PONTO DE VENDA
VISÃO USER

OBJETIVO | VENDAS

Mês PRODUTO	JAN			FEV			MAR			ABR			MAI			JUN			JUL			AGO			SET			OUT			NOV			DEZ			Total		
	O	R	%	O	R	%	O	R	%	O	R	%	O	R	%	O	R	%	O	R	%	O	R	%	O	R	%	O	R	%	O	R	%	O	R	%	O	R	%
ELETRICIDADE	1.729	1.315	76%	766	789	103%	1.153	1.202	104%	1.265	1.380	109%	1.252	1.372	110%	1.525	1.523	100%	1.738	1.621	93%	1.574	1.597	102%	1.715	1.627	95%	1.643	1.604	98%	1.656	1.607	97%	1.626	1.670	103%	17.642	17.307	98%
Manager 1																																							
Manager 2																																							
Manager 3																																							
SOLAR	1.729	1.315	76%	766	789	103%	1.153	1.202	104%	1.265	1.380	109%	1.252	1.372	110%	1.525	1.523	100%	1.738	1.621	93%	1.574	1.597	102%	1.715	1.627	95%	1.643	1.604	98%	1.656	1.607	97%	1.626	1.670	103%	17.642	17.307	98%
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GÁS	1.729	1.315	76%	766	789	103%	1.153	1.202	104%	1.265	1.380	109%	1.252	1.372	110%	1.525	1.523	100%	1.738	1.621	93%	1.574	1.597	102%	1.715	1.627	95%	1.643	1.604	98%	1.656	1.607	97%	1.626	1.670	103%	17.642	17.307	98%
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FUNCIÓNA	1.729	1.315	76%	766	789	103%	1.153	1.202	104%	1.265	1.380	109%	1.252	1.372	110%	1.525	1.523	100%	1.738	1.621	93%	1.574	1.597	102%	1.715	1.627	95%	1.643	1.604	98%	1.656	1.607	97%	1.626	1.670	103%	17.642	17.307	98%
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SAÚDE	1.729	1.315	76%	766	789	103%	1.153	1.202	104%	1.265	1.380	109%	1.252	1.372	110%	1.525	1.523	100%	1.738	1.621	93%	1.574	1.597	102%	1.715	1.627	95%	1.643	1.604	98%	1.656	1.607	97%	1.626	1.670	103%	17.642	17.307	98%
Manager 1																																							
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FATURA SÓLIDA	1.729	1.315	76%	766	789	103%	1.153	1.202	104%	1.265	1.380	109%	1.252	1.372	110%	1.525	1.523	100%	1.738	1.621	93%	1.574	1.597	102%	1.715	1.627	95%	1.643	1.604	98%	1.656	1.607	97%	1.626	1.670	103%	17.642	17.307	98%
Manager 1																																							
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FATURA ELETRÓNICA	1.729	1.315	76%	766	789	103%	1.153	1.202	104%	1.265	1.380	109%	1.252	1.372	110%	1.525	1.523	100%	1.738	1.621	93%	1.574	1.597	102%	1.715	1.627	95%	1.643	1.604	98%	1.656	1.607	97%	1.626	1.670	103%	17.642	17.307	98%
Manager 1																																							
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COMTA CERTA	1.729	1.315	76%	766	789	103%	1.153	1.202	104%	1.265	1.380	109%	1.252	1.372	110%	1.525	1.523	100%	1.738	1.621	93%	1.574	1.597	102%	1.715	1.627	95%	1.643	1.604	98%	1.656	1.607	97%	1.626	1.670	103%	17.642	17.307	98%
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DÉFITO DIFITO	1.729	1.315	76%	766	789	103%	1.153	1.202	104%	1.265	1.380	109%	1.252	1.372	110%	1.525	1.523	100%	1.738	1.621	93%	1.574	1.597	102%	1.715	1.627	95%	1.643	1.604	98%	1.656	1.607	97%	1.626	1.670	103%	17.642	17.307	98%
Manager 1																																							
Manager 2																																							
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WALLBOX	1.729	1.315	76%	766	789	103%	1.153	1.202	104%	1.265	1.380	109%	1.252	1.372	110%	1.525	1.523	100%	1.738	1.621	93%	1.574	1.597	102%	1.715	1.627	95%	1.643	1.604	98%	1.656	1.607	97%	1.626	1.670	103%	17.642	17.307	98%
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CERTIFICAÇÃO ENERGÉTICA	1.729	1.315	76%	766	789	103%	1.153	1.202	104%	1.265	1.380	109%	1.252	1.372	110%	1.525	1.523	100%	1.738	1.621	93%	1.574	1.597	102%	1.715	1.627	95%	1.643	1.604	98%	1.656	1.607	97%	1.626	1.670	103%	17.642	17.307	98%
Manager 1																																							
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Figure 43 - YTD sales growth vision

In figure 44 is possible to see the second table of this evolution vision. This table's goal is to show information about the sales productivity by working day for each month. As the first table, also shows information by month and product with a drill-down into the hierarchy. Each month has 3 columns, the first one is a traffic light that is green if the productivity is higher than the previous month and red if it is not, the second is the % difference between the sales productivity of the month M and M-1 and the last is the raw productivity of the month per working day.

PRODUTIVIDADE DU

Mês	JAN			FEV			MAR			ABR			MAI			JUN			JUL			AGO			SET			OUT			NOV			DEZ		
	PRODUZ	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU	Δ %	POU					
ELETRICIDADE	-1%	284	-42%	164	25%	295	33%	272	19%	324	-6%	336	-4%	324	-1%	322	15%	371	12%	418	-2%	410	6%	429												
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SOLAR	-1%	284	-42%	164	25%	295	33%	272	19%	324	-6%	336	-4%	324	-1%	322	15%	371	12%	418	-2%	410	6%	429												
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Manager 3																																				
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Manager 3																																				
SAÚDE	-1%	284	-42%	164	25%	295	33%	272	19%	324	-6%	336	-4%	324	-1%	322	15%	371	12%	418	-2%	410	6%	429												
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Manager 3																																				
FATURA SEGURA	-1%	284	-42%	164	25%	295	33%	272	19%	324	-6%	336	-4%	324	-1%	322	15%	371	12%	418	-2%	410	6%	429												
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Manager 3																																				
FATURA ELETRÓNICA	-1%	284	-42%	164	25%	295	33%	272	19%	324	-6%	336	-4%	324	-1%	322	15%	371	12%	418	-2%	410	6%	429												
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CONTA CERTA	-1%	284	-42%	164	25%	295	33%	272	19%	324	-6%	336	-4%	324	-1%	322	15%	371	12%	418	-2%	410	6%	429												
Manager 1																																				
Manager 2																																				
Manager 3																																				
DÉBITO DIRETO	-1%	284	-42%	164	25%	295	33%	272	19%	324	-6%	336	-4%	324	-1%	322	15%	371	12%	418	-2%	410	6%	429												
Manager 1																																				
Manager 2																																				
Manager 3																																				
WALLBOX	-1%	284	-42%	164	25%	295	33%	272	19%	324	-6%	336	-4%	324	-1%	322	15%	371	12%	418	-2%	410	6%	429												
Manager 1																																				
Manager 2																																				
Manager 3																																				
CERTIFICAÇÃO ENERGÉTICA	-1%	284	-42%	164	25%	295	33%	272	19%	324	-6%	336	-4%	324	-1%	322	15%	371	12%	418	-2%	410	6%	429												
Manager 1																																				
Manager 2																																				
Manager 3																																				

Figure 44 - YTD sales productivity per working day

After completing the development of the new sales reports, a testing period took place. It was possible to test all the features inside the reports and assure that everything was working properly. The data shown in the reports was also subject to testing, so it was possible to guarantee that the data had good quality and that the management teams had reliable information for decision-making.

## 6. CONCLUSIONS

The main goal of this project was to implement a Business Intelligence framework that could solve the problems of the sales reports delivered to the channels management teams. It was also done extra developments to improve the reporting system inside the department.

Knowing the importance of this information to the channel management teams, the new solution allows them to analyse the sales data on time and retrieve essential insights on how the business and themselves are performing. They will be able to identify improvement opportunities and problems that arise.

The data used for the implemented solution was provided by an information system department inside the company. The data used in the study of the reports was collected by sending a survey to the channel's management teams.

The first successful development in this project was the reporting browser. This allows the management teams to know which reports they have access to and makes it easier to access them.

An ETL process was created in SAS with the objective of cleaning and performing the necessary transformations to the sales data of each channel, so it could be loaded into various data flows located in the Power BI service online.

After importing the data from the dataflows into Power BI, a generic data model was created for all the planned reports. When producing the desired reports, multiple metrics and KPIs were created to show the information in multiple tables and visualisations, that help to monitor and analyse the sales data.

The final version of this project allows each end-user, of each hierarchy to receive their daily PDF of the sales and product activations reports. If wanted the hierarchies that do have access to Power BI online, can take advantage of a self-service analysis of the reports provided. This project helped to solve the existing problems that the old reports had, by improving their general quality and the reporting system itself. In the future, it will be possible to apply this solution to other types of information that are available in the department.

## 7. LIMITATIONS

The biggest limitation of this project was the number of information levels that exist inside the sales department, meaning that it was needed to create a solution that fitted the needs of five sales channels and inside each channel, there were multiple hierarchies, so it was a challenge to find solutions to present the data in a meaningful way that everyone could have the best insights possible. This led to extensive work in creating multiple reports that had the same look & feel and the same information with just a few tweaks to every channel. As it is a sales department, the end-users all prefer seeing data in a tabular form, which made it difficult to try to implement other types of visualisations.

Delivering the sales information to all hierarchies from the channels, was also very challenging because the lowest levels did not have access to the self-service BI systems, so it was needed to build a solution that would allow the information to still be delivered to these users. This led to the report pages being very large and in a PDF look, so when the data was refreshed each user would receive by email its own personal report page.

The data used in the reports was provided by an information system department in the company. The data delivered would sometimes have issues and it couldn't be used for reporting or testing new features. This led to time constraints when building this framework solution.

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# 9. APPENDIX

## 9.1. MANAGEMENT MTD SALES REPORT MOCKUP

DCP | DIREÇÃO CANAIS PRESENCIAIS
edp
COMERCIAL

### REPORT ANGARIAÇÕES

HIERARQUIA: DIREÇÃO 2022 ▾ dezembro ▾

DADOS ATÉ: (Vazio)

DU LOJAS: (Vazio)  
DU AGENTES: (Vazio)  
DU D2D: (Vazio)  
DU RAD: (Vazio)  
DU IMOB: (Vazio)

VISÃO EXECUTIVA

ENERGIA

KPI

ELETRICIDADE

GÁS

SOLAR

WALLBOX

FUNCONA

F. SEGURA

SÁUDE

C. ENERGÉTICA

F. ELETRÔNICA

C. CERTA

D. DIRETO

%OBJ tend.

Δ PDU

VISÃO PRODUTO

ELETRICIDADE

OBJ M REAL TEND %OBJ Δ PDU

Total	OBJ M	REAL	TEND	%OBJ	Δ PDU
<b>LOJAS</b>					
<b>AGENTES</b>					
AE					
Cluster B					
Cluster C					
<b>D2D</b>					
<b>RAD</b>					

GÁS

OBJ M REAL TEND %OBJ Δ PDU

Total	OBJ M	REAL	TEND	%OBJ	Δ PDU
<b>LOJAS</b>					
<b>AGENTES</b>					
AE					
Cluster B					
Cluster C					
<b>D2D</b>					
<b>RAD</b>					

SOLAR

OBJ M REAL TEND %OBJ Δ PDU

Total	OBJ M	REAL	TEND	%OBJ	Δ PDU
<b>LOJAS</b>					
<b>AGENTES</b>					
AE					
Cluster B					
Cluster C					
<b>D2D</b>					
<b>RAD</b>					

FUNCIONA

OBJ M REAL TEND %OBJ Δ PDU

Total	OBJ M	REAL	TEND	%OBJ	Δ PDU
<b>LOJAS</b>					
<b>AGENTES</b>					
AE					
Cluster B					
Cluster C					
<b>D2D</b>					
<b>RAD</b>					

SÁUDE

OBJ M REAL TEND %OBJ Δ PDU

Total	OBJ M	REAL	TEND	%OBJ	Δ PDU
<b>LOJAS</b>					
<b>AGENTES</b>					
AE					
Cluster B					
Cluster C					
<b>D2D</b>					
<b>RAD</b>					

F. SEGURA

OBJ M REAL TEND %OBJ Δ PDU

Total	OBJ M	REAL	TEND	%OBJ	Δ PDU
<b>LOJAS</b>					
<b>AGENTES</b>					
AE					
Cluster B					
Cluster C					
<b>D2D</b>					
<b>RAD</b>					

F. ELETRÔNICA

OBJ M REAL TEND %OBJ Δ PDU

Total	OBJ M	REAL	TEND	%OBJ	Δ PDU
<b>LOJAS</b>					
<b>AGENTES</b>					
AE					
Cluster B					
Cluster C					
<b>D2D</b>					
<b>RAD</b>					

CONTA CERTA

OBJ M REAL TEND %OBJ Δ PDU

Total	OBJ M	REAL	TEND	%OBJ	Δ PDU
<b>LOJAS</b>					
<b>AGENTES</b>					
AE					
Cluster B					
Cluster C					
<b>D2D</b>					
<b>RAD</b>					

DÉBITO DIRETO

OBJ M REAL TEND %OBJ Δ PDU

Total	OBJ M	REAL	TEND	%OBJ	Δ PDU
<b>LOJAS</b>					
<b>AGENTES</b>					
AE					
Cluster B					
Cluster C					
<b>D2D</b>					
<b>RAD</b>					

C. ENERGÉTICA

OBJ M REAL TEND %OBJ Δ PDU

Total	OBJ M	REAL	TEND	%OBJ	Δ PDU
<b>LOJAS</b>					
<b>AGENTES</b>					
AE					
Cluster B					
Cluster C					
<b>D2D</b>					
<b>RAD</b>					
<b>IMOBILIÁRIAS</b>					

WALLBOX

OBJ M REAL TEND %OBJ Δ PDU

Total	OBJ M	REAL	TEND	%OBJ	Δ PDU
<b>LOJAS</b>					
<b>AGENTES</b>					
AE					
Cluster B					
Cluster C					
<b>D2D</b>					
<b>RAD</b>					

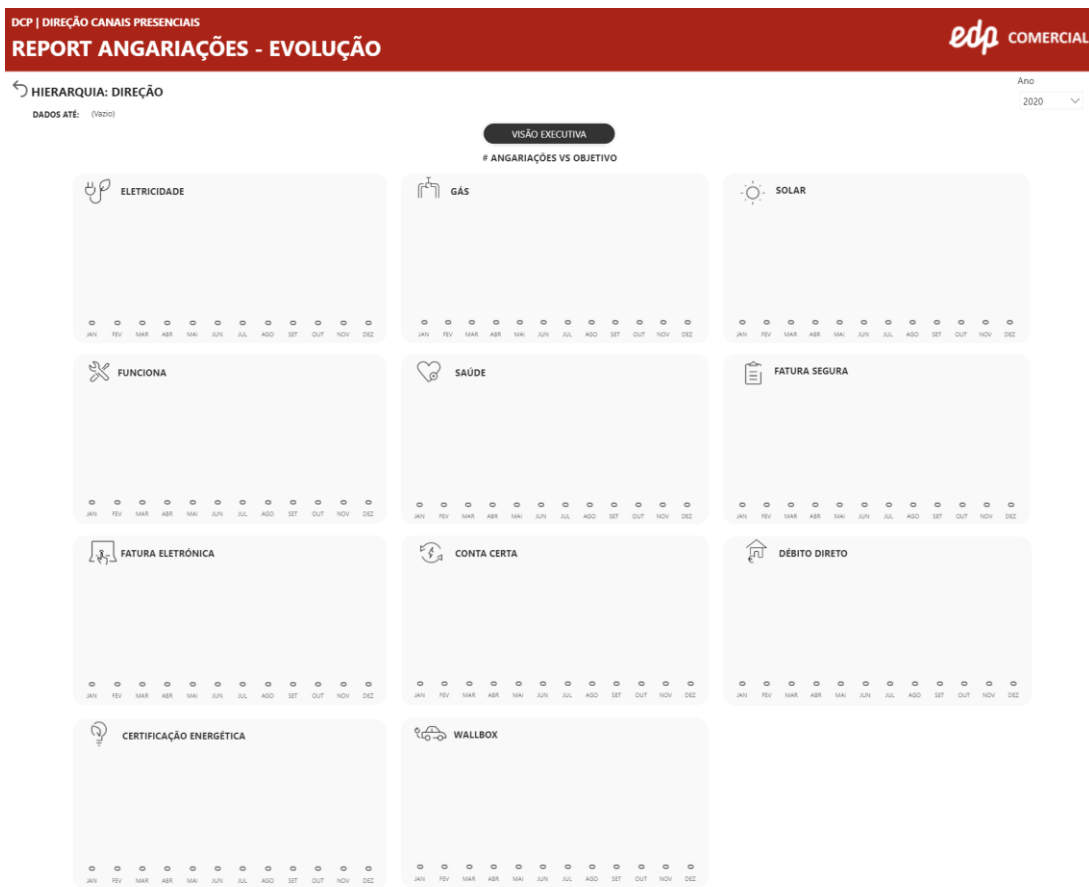


VISÃO DIÁRIA

PRODUTO	Obj DU	Média DU	Obj Nec. DU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total		

Appendix 1 - Management MTD sales report mockup

## 9.2. MANAGEMENT YTD SALES REPORT MOCKUP





PRODUTIVIDADE DU

Mês	JAN			FEV			MAR			ABR			MAI			JUN			JUL			AGO			SET			OUT			NOV			DEZ		
	PRODUTO	Δ	%	PDU	Δ	%	PDU	Δ	%	PDU	Δ	%	PDU	Δ	%	PDU	Δ	%	PDU	Δ	%	PDU	Δ	%	PDU	Δ	%	PDU	Δ	%	PDU	Δ	%	PDU		
<b>ELETRICIDADE</b>																																				
LOJAS																																				
AGENTES																																				
DDD																																				
RAD																																				
IMOBILIÁRIAS																																				
<b>SOLAR</b>																																				
LOJAS																																				
AGENTES																																				
DDD																																				
RAD																																				
IMOBILIÁRIAS																																				
<b>GÁS</b>																																				
LOJAS																																				
AGENTES																																				
DDD																																				
RAD																																				
IMOBILIÁRIAS																																				
<b>FUNCIÓNIA</b>																																				
LOJAS																																				
AGENTES																																				
DDD																																				
RAD																																				
IMOBILIÁRIAS																																				
<b>SAÚDE</b>																																				
LOJAS																																				
AGENTES																																				
DDD																																				
RAD																																				
IMOBILIÁRIAS																																				
<b>FATIMA SEGURA</b>																																				
LOJAS																																				
AGENTES																																				
DDD																																				
RAD																																				
IMOBILIÁRIAS																																				
<b>FATIMA ELETRÓNICA</b>																																				
LOJAS																																				
AGENTES																																				
DDD																																				
RAD																																				
IMOBILIÁRIAS																																				
<b>CONTA CEREA</b>																																				
LOJAS																																				
AGENTES																																				
DDD																																				
RAD																																				
IMOBILIÁRIAS																																				
<b>DÉBITO DIRETO</b>																																				
LOJAS																																				
AGENTES																																				
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RAD																																				
IMOBILIÁRIAS																																				
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RAD																																				
IMOBILIÁRIAS																																				
<b>CERTIFICAÇÃO ENERGÉTICA</b>																																				
LOJAS																																				
AGENTES																																				
DDD																																				
RAD																																				
IMOBILIÁRIAS																																				

Appendix 2 - Management YTD sales report mockup



**NOVA Information Management School**  
**Instituto Superior de Estatística e Gestão de Informação**

Universidade Nova de Lisboa