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e-Business Report: Enablement Process KPIs Dashboards

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Resumo

A tese em questão surgiu de um problema colocado em ambiente empresarial, nomeadamente na empresa BNP Paribas, sobre a necessidade de monitorizar o desempenho dos elementos da equipa de ECS sobre as suas funções de *Enablements*. Assim, estabeleceu-se como principal objetivo a criação de *Dashboards* que possuíssem um conjunto de características para avaliar essa *performance*.

Para tal, foi utilizada uma ferramenta de visualização de dados denominada Tableau, seguindo a metodologia CRISP-DM.

Com recurso ao conhecimento adquirido na elaboração da Revisão Sistemática da Literatura, aplicando os passos da metodologia escolhida e conferenciando com os elementos da equipa, estabeleceram-se indicadores-chave e métricas que asseguraram a avaliação do desempenho e permitiram a criação dos *Dashboards*.

Todo este procedimento levou à implementação dos *Dashboards* na empresa e à sua constante utilização e consulta, resultando numa solução bem-sucedida ao problema enunciado.

Palavras-chave: Análise de Dados, *Dashboard*, Indicadores-chave, Tableau, Visualização de Dados

Sistema de Classificação JEL: C55, G21

Abstract

This thesis originated from a problem proposed in a work environment, more specifically in BNP Paribas company, about the urge to monitor the performance of Enablements of some people from ECS team. Therefore, it was established as the main goal the construction of Dashboards with a set of features to evaluate that performance.

For that, a data visualization tool named Tableau was used, following CRISP-DM methodology.

Using the knowledge acquired in the elaboration of the Literature Review, applying the steps of the chosen methodology, and discussing them with the team members, KPIs and metrics were defined to assure that monitorization and the creation of the mentioned Dashboards.

All this procedure led to the implementation of the Dashboards in the company and to their constant use, resulting in a very successful solution to the problem at hand.

Keywords: Dashboards, Data Analytics, Data Visualization, KPI, Tableau

JEL Classification: C55, G21

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Acronyms List

AMER – Americas

APAC – Asia-Pacific

API – Application Programming Interface

CIB – Corporate and Institutional Banking

CRISP-DM – Cross Industry Process for Data Mining

CRM – Client Relationship Management

ECS – Electronic Client Solution

EMEA – Europe, Middle East, and Africa

GBL – Global Business Line

GM – Global Markets

ID – Identification

KPI – Key Performance Indicator

MDP – Multi Dealer Platform

SD – Smart Derivatives

SDP – Single Dealer Platform

URL – Uniform Resource Locator

CHAPTER 1

Introduction

In this chapter it is defined the research problem that was tackled, the questions and motivations that led to the writing of this project, and the goals established. After, it is mentioned the methodology used and the structure of this document.

Before diving into the listed topics, it is important to give some context of this project's main theme. It was developed under BNP Paribas Investment Bank, in Electronic Client Solutions (ECS) team. This team has as one of its tasks to grant approval to clients and its contacts to access certain electronic platforms for them to trade BNP products. This process is named Enablement and it consists of a request submitted by sales that needs to be approved by ECS team members.

1.1. Research Problem

The research problem that arises is that ECS does not have a tool to monitor their performance when it comes to enabling their clients to financial products in their electronic platforms. This constitutes a problem because the team does not have any way to access their work, to manage it, and to identify possible aspects that may be lacking in their performance. The solution for this is the creation of a report that has some dashboards with centralized and treated information about the Enablement process, in the form of Key Performance Indicators (KPIs).

1.2. Research Question, Motivations, and Goals

The research question that comes from the problem explained in the previous topic is the following: Using Dashboards as a visualization tool, how can ECS team performance be evaluated when it comes to Clients and its Contacts Enablement process for financial products in electronic platforms and how can this process be optimized?

The main contributions that this project will bring are: to help the team to take decisions based on data/ solid information, optimize the Enablement process, detect future problems and develop new features for it, and better manage their staff and keep them and other parties accountable of their work.

The specific goals defined by the author and ECS team are the following:

- Defining the KPIs that keep track of the team performance, being those specified by the team;
- Retrieving the necessary variables to calculate the KPIs. To obtain truthful information, the data will be retrieved from Antiphony, an internal platform that keeps record of Enablements, through a Python script;
- Construction of a report, which will contain dashboards with the defined KPIs, using Tableau data visualization tool;
- Evaluate and manage on a regular basis the dashboards, checking if the correct data is being fed to the report.

1.3. Methodology Approach

The methodology chosen to operate this project is Cross Industry Process for Data Mining (CRISP-DM). It was chosen for being one of the most popular and structured frameworks and for providing an easy comprehension of the data science workflow (Saltz, 2021). It consists of 6 steps: Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation, and Deployment (see Figure 1.1).

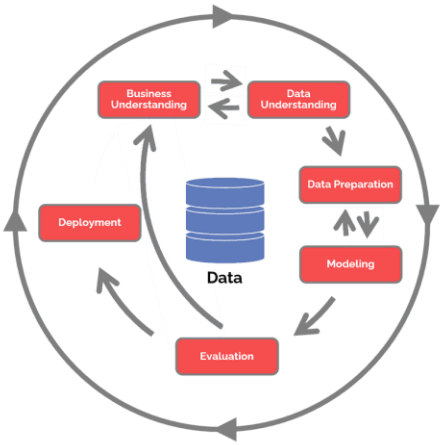

Figure 1.1 – CRISP-DM Methodology

Source: Wikipedia

When it comes to Business Understanding, an overview of BNP Paribas is made about its history, mission, vision, as well as an explanation from the broader structures of the bank to ECS's team.

Then, in Data Understanding, it is explained the Enablement process, how the data is retrieved through a Python script, and what is each variable used for in order to build the dashboards.

Data Preparation is the phase where the guidelines for the KPIs are defined, the variables are altered/improved and is done some cleanup. Also, it is the phase that contains the iterations to the dashboards until the final result. The dashboards were built using the online version of Tableau.

Modeling consists of achieving the best dashboards that showcase the KPIs in its most optimized way and Evaluation requires the approval and opinion from ECS team, where a survey was conducted. Lastly, Deployment translates to sharing the dashboards with the team and interested parts, as well as the elaboration of this thesis that works as a procedure to obtain a better understanding of all the process behind it.

1.4. Project Structure

This project has five chapters. In the first chapter, it is described the research problem, the question originated from that problem, motivations, and goals. It also mentions the methodology chosen and how this project is structured.

In the second chapter, it is presented the literature review, where the protocol is clarified, and four topics are approached: Dashboard, KPI, Tableau, and Python.

In the third chapter, it is included the first three phases of CRISP-DM Methodology: Business Understanding, Data Understanding, and Data Preparation.

In the fourth chapter, the Results are presented, divided into four sections: Clients, Contacts, Enablements, and Times Response, which corresponds to the Modeling phase. The Evaluation and Implementation phases are also included in this chapter.

´Finally, in the fifth chapter, the Conclusion is drawn, where it is enhanced the success and contributions of the project, as well as the limitations and future works to improve it.

CHAPTER 2

Literature Review

In this chapter it is presented the Systematic Literature Review (SLR) of this project, where a search was conducted to find several scientific papers to answer the research question, that have to obey to a group of specific criteria (Seuring et al., 2005).

Firstly, the SLR Protocol is presented, where it explains the process used to obtain the articles. Then the definition of Dashboard and KPI is explored and is shown how KPIs can be presented in a Dashboard. After that, a small introduction to Tableau is written as well as a comparison between this tool and other similar ones, to corroborate the use of Tableau in this project. Additionally, there is a section explaining how Python can be used to retrieve data and extract it to Tableau.

Lastly, the articles selected are submitted to a quality evaluation to quantify its level of contribution for this project.

2.1. Systematic Literature Review Protocol

Aligned with the theme of the thesis, the SLR has a purpose of finding articles that allow to answer the following research question: “Using Dashboards as a visualization tool, how can ECS team performance be evaluated when it comes to Clients and its Contacts Enablement process for financial products in electronic platforms and how can this process be optimized?”. More specifically, it answers to the questions: (1) What is a Dashboard and what is its goal/purpose?; (2) What are KPIs and how can them be utilized to evaluate performance?; (3) What is Tableau?; (4) What is Python and how can it be implemented to retrieve data and export it to Tableau?

When it comes to the articles included in the SLR, 4 of them were retrieved when an initial search about the theme was conducted, during the introduction chapter. The other articles followed a more methodic system and were searched both in Web of Science (https://www.webofscience.com/wos/woscc/basic-search) and Scopus (https://www.scopus.com/search/form.uri?display=basic#basic) scientific database. Both this sources where chosen to give a broader selection of articles and to return a more accurate portrait of the scholarly impact of researchers (Meho & Yang, 2007).

First the keywords were defined, which resulted in Dashboard, KPI, Tableau and Python, and then organized in 3 queries: Web of Science – (1) (Dashboard AND KPI) OR (Tableau AND Dashboard), (2) Tableau Software; Scopus – (3) tableau AND python AND Dashboard. A total of 28 articles were retrieved. Lastly, inclusion and exclusion eligible criteria were defined (illustrated in Table 2.1) to give a narrower selection of articles, since the goal is to select at least 20 articles.

Table 2.1 – Inclusion and Exclusion criteria for the Systematic Literature Review

Inclusion criteria	Exclusion criteria
Articles that mentioned the following keywords: - Dashboard; - KPI; - Tableau; - Python.	Articles not written in English;
	Articles published before 2013;
	Articles where it is not possible to acquire the digital document for free;
	Duplicate Articles;
	Articles that deviate from the theme of the project.

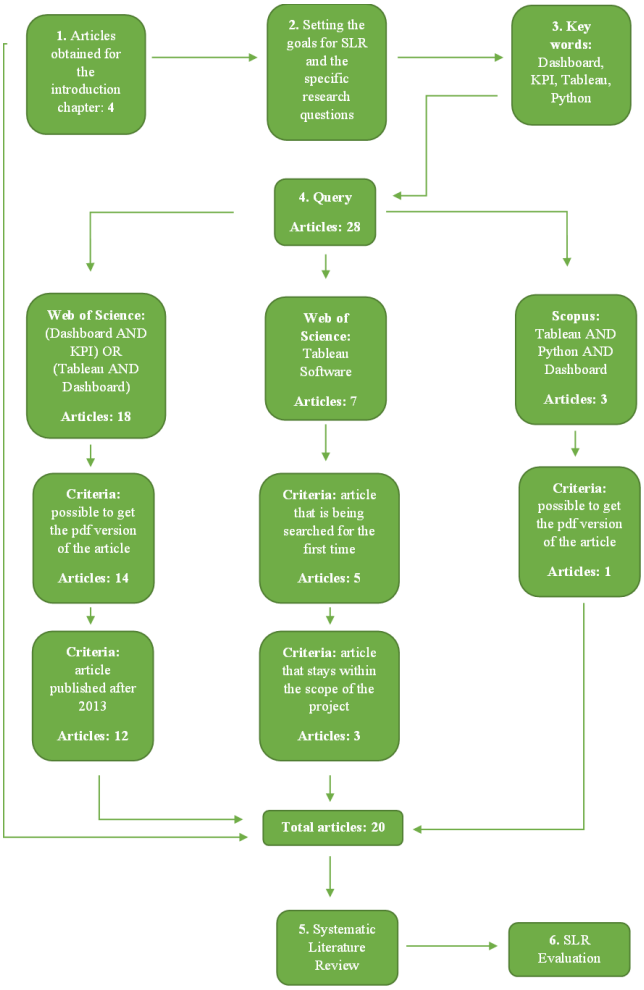

Figure 2.1 – Systematic Literature Review Protocol

In order to ensure the article respected the previous criteria's, it was necessary to check the title, year of publication, abstract, key words and give a quick read through the article to see if it was relevant to include it and did not go too far out of the thesis scope (see Figure 2.1). Of the 28 articles searched, 12 were excluded. Adding the 4 articles that had already been selected resulted in a total of 20 articles, exposed in Table 2.2.

Table 2.2 – Articles included in the SLR

ID	Year	Title	Journal	Authors
1	2021	*A data-driven approach to shared decision-making in a healthcare environment*	*Opsearch*	Singh, S., Verma, R. & Koul, S.
2	2019	*A KPI-based Condition Monitoring System for the Beer Brewing Process*	*24th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA)*	Pasic, F., Wohlers, B., Dzwiok, S., Becker, M. & Heinrich, M.
3	2022	*A lesson in Tableau Dashboard design: Playing the beer game with a real-time data connection*	*Decision Sciences Journal of Innovative Education*	Meyer, B.C., & Bishop, D.S
4	2017	*Application of Data Mining techniques to identify relevant Key Performance Indicators*	*Computers Standards & Interfaces*	Peral, J., Mate, A. & Marco, M
5	2015	*Corporate Dashboard For Payphone Service*	*Innovation and Analytics Conference and Exhibition*	Siraj, F. & Shadan, H.
6	2021	*Dashboard Visualisation for Healthcare Performance Management: Balanced Scorecard Metrics*	*Asia Pacific Journal of Health Management*	Victor, S. & Farooq, A.
7	2021	*Data analytics for traffic flow prediction in Custom using Long Short Term Memory (LSTM) networks*	*Journal of Physics: Conference Series*	Loon, P., Reafie, E. & Faudzi, A.
8	2022	*Dimensions of performance and related key performance indicators addressed in healthcare organisations: A literature review*	*International Journal of Health Planning and Management*	Gartner, J. & Lemaire, C.
9	2020	*Entrepreneurial University: Catalyst for Regional Sustainable Development*	*Sustainability*	Bratucu, G., Lixandroiu, R., Constantin, C., Tecau, A., Chitu, I. & Trifan, A.
10	2020	*Extraction of information from log files Using Python Programming and Tableau*	*2020 15th Iberian Conference on Information Systems and Technologies*	Rigueira, F., Bernardino, J., & Pedrosa, I
11	2019	*Evaluation and Analysis of Business Intelligence Data Visualization Tools*	*2019 14th Iberian Conference on Information Systems and Technologies (CISTI)*	Lousa, A., Pedrosa, I., & Bernardino J
12	2021	*HAPI: An API standard for accessing Heliophysics time series data*	*Journal of Geophysical Research: Space Physics*	Weigel, R. S., Vandegriff, J., Faden, J., King, T., Roberts, D. A., Harris, B., et al
13	2021	*Implementation of 5S+S for knowledge work in engineering projects*	*International Conference on Advances in Production Management Systems (APMS)*	Larsson, D. & Ratnayake, R.

(Table 2.2 – continued)

14	2019	*Improving Processes in Postgraduate Office of a University through Lean Offices Tools*	*International Journal for Quality Research*	Magalhães, J., Alves, A., Costa, N. & Rodrigues A.
15	2016	*KPIs 4 Workplace Learning*	*8th International Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management*	Emmenegger, S., Hinkelmann, K., Thönssen, B. & Witschel F.
16	2021	*On the relevance of self-service business intelligence to university management*	*Journal of Accounting & Organizational Change*	Arnaboldi, M., Robbiani, A. & Carlucci P.
17	2019	*Proposition of Rank-Based Stepwise Interactive Visualization for Customer Segmentation in E-Commerce*	*2nd International Conference on Software Engineering and Information Management (ICSIM)*	Sheng, T. & Subramaniam, P.
18	2022	*Revealing the role of intellectual capital in digitalized health networks. A meso-level analysis for building and monitoring a KPI Dashboard*	*Technological Forecasting and Social Change*	Francesco S., Leone, D., Caporuscio, a. & Kumar, A.
19	2018	*Teaching Data Analytics Skills in Auditing Classes Using Tableau*	*Journal of Emerging Technologies in Accounting*	Weirich, T., Tschakert, N. & Kozlowski, S.
20	2019	*The Proposed Dashboard Model for Measuring Performance of Small-Medium Enterprises (SME)*	*International Journal of Integrated Engineering*	Immawan, T., Pratiwi, A. & Cahyo, W.

2.2. Dashboard

The Dashboard is the object of study of this thesis, so it is crucial to comprehend its significance and its strengths to produce results. Companies that deal with enormous amounts of data reach out more and more for this type of presentation tool that allows to check in real time its performance and it gives a shorter responsive time when it comes to making decisions (Peral et al., 2017).

Quoting Meyer and Bishop (2022, p.212) “There is a difference between creating a visualization and basing an action on the visualization, between making a forecast and using a forecast, and between discovering a relationship and leveraging that relationship into action. One involves being able to manipulate data and apply modeling skills; the other requires knowledge of the business system and its behavior.” Building a visually pleasing Dashboard is appreciated, but being able to understand the data and turn it into knowledge matters more.

Another important aspect to refer is that Dashboards are not only used in business/economics fields, but they are also used in other areas like healthcare (Singh et al., 2021), academic research, engineering and so on, proving its versatility.

2.2.1. Dashboard Definition

Dashboard is a visualization tool that helps to identify the key items of an area or field of expertise and the ones that do not meet the goal defined. It enhances areas of concern but also opportunities and helps managers to know their business and to make decisions based on it. In short, it assists the organization by assessing its performance, visualizing aggregated data while using different types of visualizations (Peral et al., 2017). Therefore, the way a Dashboard is build/design is of extreme importance to understand what is being analyzed and what analysis are expected to be retrieved from it (Siraj & Shadan, 2015). Aspects like color, fonts and being user friendly are imperative to build a cohesive Dashboard. (Meyer & Bishop, 2022).

The term Dashboard goes back to the 70s, with the surge of the web. Quoting Siraj and Shadam (2015, p.2) “Dashboards were constructed to represent financial measures that even executives could understand. A Dashboard defined by as a multilayered application built on business intelligence and data integration infrastructure that enables organization to measure, monitor and manage business performance more effectively. The conclusion has made that performance Dashboards deliver the right information to the right users at the right time to optimize decisions, enhance efficiency, and accelerate bottom-line results.”

2.2.2. Elements and good practices to build a Dashboard

Based on Siraj and Shadam (2015), there are some good practices in order to make a good Dashboard, being the following:

- Go for a simple design that includes the major and most important key points;
- Do not overwork the formatting because it might distract the audience for what matters (the calculated measures);
- Do not put too many measures in a single Dashboard. It must be easy to read and intuitive. The recommendation is not to put more than six windows;
- Work on the layout and placement of the measures. The Dashboard is a way of storytelling about a certain matter, so a good example is to present the more general measurements first and at the top, and as you go down you can start detailing them.

Nowadays, Dashboards can be updated in real time and have interactive features, like filters, that allow you to select only the key points about a certain variable, scenario analysis and outlier detection (Victor & Farooq, 2021). That also makes a good element to include on a Dashboard.

As it can be observed in Figure 2.2, a Dashboard should have a title (green rectangle in the left superior corner), start with more generalized metrics that can be represented in a card graph (green rectangle below) and other measures that, using the appropriate color, show if the target was met or not (green rectangle on the right). At the lower part of the Dashboard, bar graphs or line graphs are good examples of how to detail information but keeping it in a simple and structured way (green rectangle at the left inferior corner). Other types of graphs that are also good to include in a Dashboard are histograms, pie charts, and tree maps, depending on the type of measure.

Figure 2.2 – Example of a Dashboard

Source: https://www.toptal.com/designers/data-visualization/Dashboard-design-best-practices

2.3. Key Performance Indicator (KPI)

As has been referenced in the previous topic, to be able to build a Dashboard it is necessary to consider the key objectives/metrics the organization wants to know. That is a KPI: a quantifiable measurement that allows to track the performance or goals of an organization and helps to make decisions about the business (Francesco et al., 2022). According to Pasic et al. (2019, p.1469) a KPI is "an existing concept that enables general statements about the products and the production process periodically based on single sensor values".

There are high-level KPIs which their purpose is to look at the overall performance of the business, while the lower-level ones focus more on a certain entity or process. One of the strongest points of a KPI is that it is calculated in a way that is easy to analyze and provide overall information that allows high-level managers to form decisions (Magalhães et al., 2019).

Overall, KPIs are calculated to plan, evaluate, and control a company's business based on its data (Victor & Farooq, 2021).

2.3.1. KPI Characteristics

In trying to obtain robust KPIs that deliver relevant and meaningful insight of a company's business, they must:

- Be SMART (Specific, Measurable, Achievable, Relevant, and Timely available). That means that a KPI must be objective (specific), quantifiable (measurable), bring knowledge in order to make decisions (relevant) and being able to be measured through time (timely) (Immawan et al., 2019);
- Aim for a 5S+S concept (sort, set in order, shine, safety, standardize, and sustain) to reduce inefficiencies by organizing the data (sort), give it some structure (set in order), polish/get rid of the noise (shine), make sure the result makes sense in the context and it is correctly measured (safety), apply on a bigger scale or in other areas (standardize), and keep track of it (sustain) (Larsson & Ratnayake, 2021);
- Have a linkage between each other. Some KPIs are developed to give some insight on other KPIs or, from a KPI certain result, a new one may be generated (Gartner & Lemaire, 2022).

On the other hand, if KPIs are not correctly calculated, they may be redundant or present misleading information. Another inconvenience is people that are responsible for them might be resistant to change or adapt them. Lastly, they can often be calculated based on results and not indicators that can be used to improve (Arnaboldi et al., 2021).

Figure 2.3 exemplifies a type of KPI, how it is measured, its unit value and the period of the measure. Some KPIs might include a threshold and/or color code.

KPI	Measurement	Lights / Threshold	Unit	Period
no of complaints of clients (about an employee / learner)	Self-assessment: interpretation of customer feedback	Green: <=20% Orange: >20% <=40% Red: >40%	%	30 days
global action per user	Log: number of interactions with Learn PAd platform in 30 days (i.e. no of comments + no of additional pages + no of pages navigated)	Green: >=12 Orange: >=5 <12 Red: <5	#	3 months
business process simulation score	Simulation: ratio of achieved business process score to the maximum of business process score	Green: >=70% Orange: >=50% <70% Red: <50%	%	30 days

Figure 2.3 – Example of KPIs and their Attributes

Source: Reprinted from Emmenegger et al., 2016

2.3.2. Balance ScoreCard

There are various scorecards models that were developed to show in a complete but objective way the key indicators of a situation. The most famous one is the Balance Scorecard, used widely in the business world, which goal is to calculate 3 to 4 KPIs for each area: Financial, Customer, Internal Business Processes and Learning and Growth (please see Figure 2.4). It helps to set targets, link metrics, understand the correlation among metrics, and easily view trends. (Victor & Farooq, 2021).

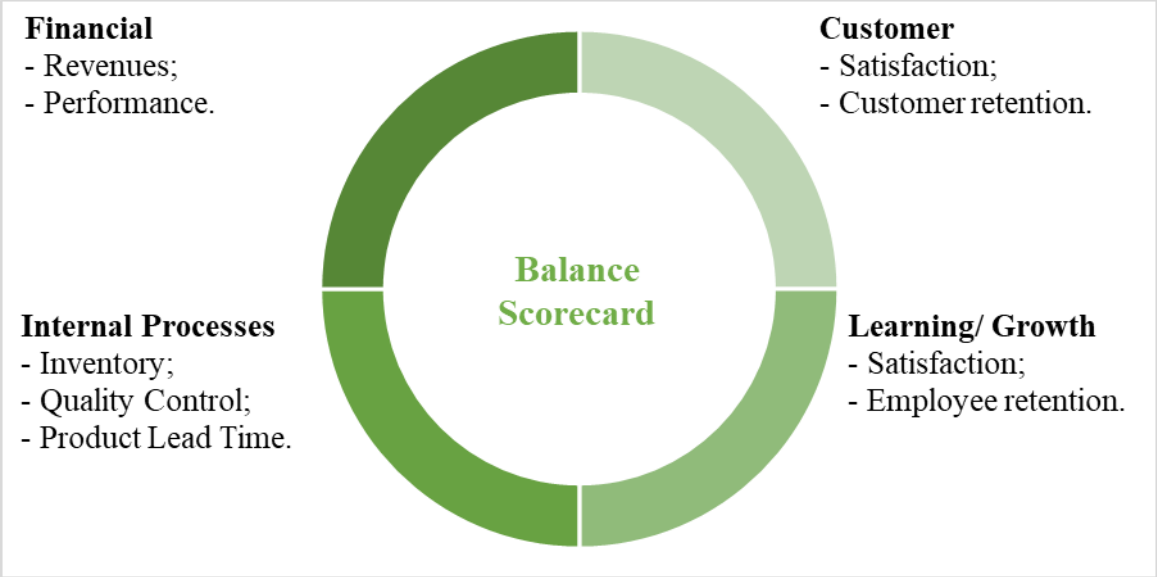

Figure 2.4 – Balance Scorecard

Source: Adapted from Victor & Farooq (2021)

2.4. Tableau

To build a Dashboard, there are numerous tools which their purpose is to do that[1]. Tableau is one of them. According to a study done by Lousa et. al (2019), Tableau and Power BI are leaders in the visualization tools market. In this chapter, a small introduction to Tableau is made, and it is also explained the preference of Tableau over other tools like Power BI.

2.4.1. Tableau's Definition and Usage

Tableau is a visualization software with a variety of functions that enhances segmentation of data (Sheng & Subramaniam, 2019). It was founded in 2003 by Christina Chabot, Pat Hanrhan and Chris Stolte in California (Lousa et al., 2019). Tableau is available in an online and desktop

[1] Such as Qlik, Tableau, Power BI, and Excel

version. The online version is available to everyone, while for the desktop version it is required a license.

The way Tableau works is the following: the data is collected and loaded to a relational database in the form of tables. The data can come from files (Excel, JSON, PDF, etc.) or from Uniform Resource Locators (URLs). Links between tables are obtained through primary keys (variable of a table that represents each record in a unique and unrepeated way, like an identification - ID) (Bratucu et al., 2020). For example, according to Loon et al. (2021, p.4) "Tableau Prep Builder is used to integrate the Python scripts for data pre-processing and prediction. Tableau is able to connect to datasources published on cloud storage in Tableau Server and update the datasources. There are two main processes in Tableau Prep Builder: training and prediction process. Python script is embedded in those block diagrams.".

After that, the data can be analyzed in worksheets where you can drag and drop variables to columns, rows, or filters. Parameters (which are dynamic values that can replace constant values in calculations), filters, and reference lines, are created to present the data in a more harmonic way and are applied to the entire workbook (name of a Tableau file). Tableau is also able to do alerting functions, by adding a reference line to a graph and changing the color of any points that are above that line (Meyer et al, 2022). Tableau has a specific type of sheet to build a Dashboard, where it displays a set of worksheets to convey information (please see Figure 2.5) (Weirich et al., 2018).

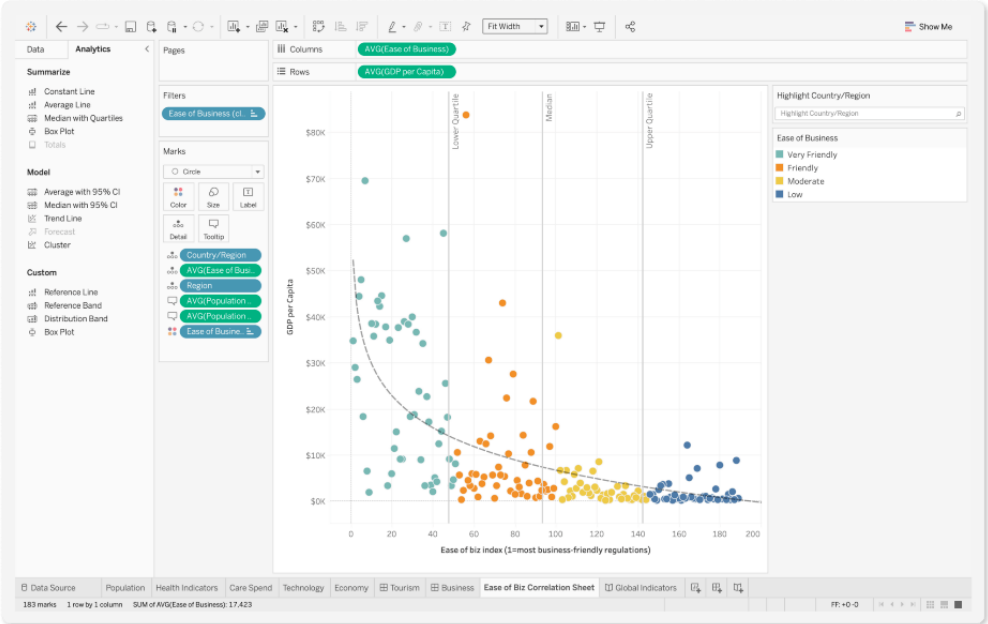

Figure 2.5 – Tableau Workbook

Source: Tableau

2.4.2. Power BI Definition and Usage

Power BI is also a visualization software, launched in 2015 by Microsoft. It has an online version and a desktop version (Lousa et al., 2019). Contrary to Tableau, the desktop version is available for Microsoft 365 clients and the online version needs to be paid in order to use all its functionalities.

The way it works is very similar to Tableau: it allows to load and connect data from files, data services and Azure to relational databases in the form of tables. Power BI, however, has three different types of views (please see Figure 2.6, green rectangle): the model (where you can visualize the database), data (where you can visualize it in a table) and the report (used to build the Dashboard). The same features described in Tableau can also be found in power BI, but the way calculated fields are created are slightly different, having a different language.

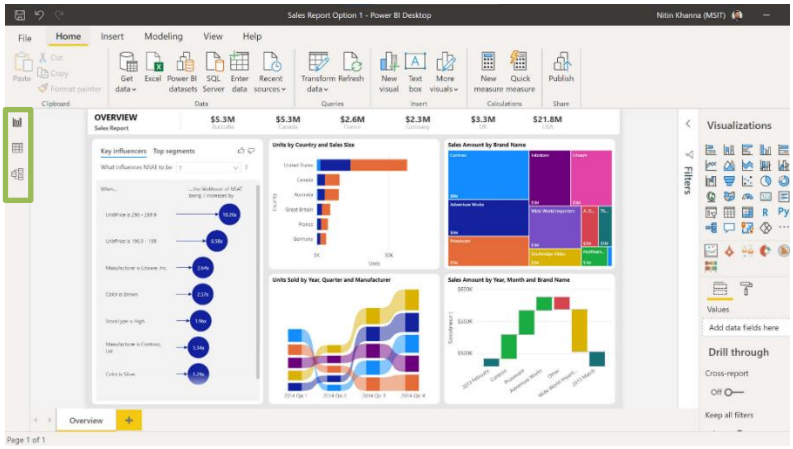

Figure 2.6 – Power BI file

Source: Microsoft

2.4.3. Comparison between Tableau and Power BI

Table 2.3 – Comparison between Tableau and Power BI

Name	Software Structure	Dashboards	Data Connection	Ease at learning	License	Extension
Tableau	Good	Very Good	Very Good	Good	Online: free Desktop: requires license	Tableau Developer Program REST API JavaScript API
Power BI	Very Good	Good	Very Good	Good	Online: Pro version is paid Desktop: free	REST API JavaScript API

Source: Adapted from Lousa et al. (2019)

Analyzing Table 2.3, Power BI has a cleaner software structure, because it divides the database, the table, and the report structure in three different tabs. On the other hand, Tableau Dashboards are more intuitive to build as well as the use of segmentation/filtering. Both have good data connection, with the particularity that Power BI can connect anything that comes from a

Microsoft tool (Excel, Sharepoint, etc.). Both require some time to learn and for people that are used to doing data analysis in Excel, it might be counterintuitive to learn Tableau. Both require some knowledge in coding when it comes to creating functions/calculated fields. Finally, the main reason why Tableau is the tool selected is because its online version is free and it becomes easier to share reports, while for Power BI, in order to do that it is necessary to acquire the pro version. Even though Tableau Desktop version requires a license, it is not necessarily required to purchase it because of how complete the online version is.

2.5. Python Software

The last topic to be addressed in the SLR is Python Software. It is a high-level coding language, developed by Guido van Russom in 1991. The reason why this software is important for the present thesis is because of Heliophysics Application Programmer's Interface (HAPI) process. It enables data providers to use a standard set of conventions for returning data in response to a URL-based request. According to Weigel et al. (2021, p.2) it "allows access to time series data in a streaming form and allows a user not to need knowledge of file system boundaries, directory layouts, and file formats. With this approach, a scientist programming in, e.g., IDL, MATLAB, or Python can use a line of code to bring data into a processing or analysis routine from a diverse set of data providers and for a wide array of data.".

In Rigueira et al. (2020) study, they create excel files from log files using Python and upload those files to Tableau in order to build a Dashboard with KPIs focused on the client behavior, demonstrating the advantages of incorporating a coding program to automatize the collecting data process. The same process was done for this project.

2.6. Scientific Articles Evaluation

To ensure the quality of the articles selected, an evaluation was conducted where seven questions were formulated based on the SLR topics (see Table 2.4).

Table 2.4 – Evaluation criteria for SLR Articles

Dashboard	Q1. What is a *Dashboard*?
	Q2. How to build a *Dashboard*?
KPI	Q3. What is a KPI?
	Q4. What are the different types of KPIs and which are the best ones to evaluate performance?
Tableau e Python	Q5. What is the practical use of Tableau tool?
	Q6. What is the practical use of Python tool?
	Q7. How can Python and Tableau be used together in data analytics?

Each question is evaluated on a scale from 0 to 1, where 0 does not answer the question, 0.5 answers partially and 1 answer in its totality.

Table 2.5 – Evaluation of SLR Articles

	Dashboard		KPIs		Tableau and Python			
ID	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Total**
1	0,5	0,5	0,5	0,5	0,5	0	0	**2,5**
2	1	1	1	1	0	0	0	**4**
3	1	1	0	0	1	0	0	**3**
4	1	1	1	1	0	0	0	**4**
5	1	1	0,5	1	0	0	0	**3,5**
6	1	1	1	1	0	0	0	**4**
7	0,5	0,5	0	0	0,5	0,5	1	**3**
8	0	0,5	1	1	0	0	0	**2,5**
9	0,5	0,5	0,5	0	1	0	0	**2,5**
10	0,5	0,5	1	1	0,5	0,5	0,5	**4,5**
11	1	1	0,5	0	1	0	0	**3,5**
12	0	0	0	0	0	1	0,5	**1,5**
13	0	0,5	0,5	0,5	0	0	0	**1,5**
14	0,5	0,5	1	1	0	0	0	**3**
15	0	1	1	1	0	0	0	**3**
16	0,5	0,5	0	0	0,5	0	0	**1,5**
17	0,5	0,5	0,5	0,5	1	0	0	**3**
18	1	0,5	1	1	0	0	0	**3,5**
19	1	0,5	0	0	1	0	0	**2,5**
20	0	0	1	1	0	0	0	**2**
Total	**11,5**	**12,5**	**12**	**11,5**	**7**	**2**	**2**	

According to Table 2.5, the article that has the highest score and that somehow answers all the questions is article number 10, with a score of 4,5 out of 7. The question with the highest score is Q2 (How to build a Dashboard?), with 12,5 out of 20. Questions related to Dashboards and KPIs scored the highest results, while questions related to Tableau were below the median (10) and questions related to Python were answered only by 3 articles.

Another interesting take is that articles number 2, 4 and 6 present the most answered questions with mark 1, ensuring its relevance for the themes related to those questions.

CHAPTER 3

Methodology

In this chapter, each step of the CRISP-DM methodology is explained in detail. It starts with Business Understanding, where a contextualization of BNP Paribas is made. After that, it is necessary to Understand the Data, how the data was collected, and the relevance of each variable used, giving a small description of them.

Next is the Data Preparation, where it is explained which techniques were used to clean the data and how the KPIs were calculated. The next phase is Modeling, where the Dashboards are built based on the KPIs obtained and the best iteration is selected to be presented.

The remaining two steps, which are Evaluation and Deployment, require that someone from the team analyzes the Dashboards and, if approved, shares them to the other members of the team and interested parts.

3.1. Business Understanding

To understand the goal of the project and the reasons behind the creation of a Dashboard to help maintain accountability of ECS performance, first it is important to know more about the company it is part of.

BNP Paribas is a bank, founded in France in 1822. It is present in 65 countries, with more than 190.000 employees, being 148.000 in Europe (Figure 3.1). It was established in Portugal in 1985.

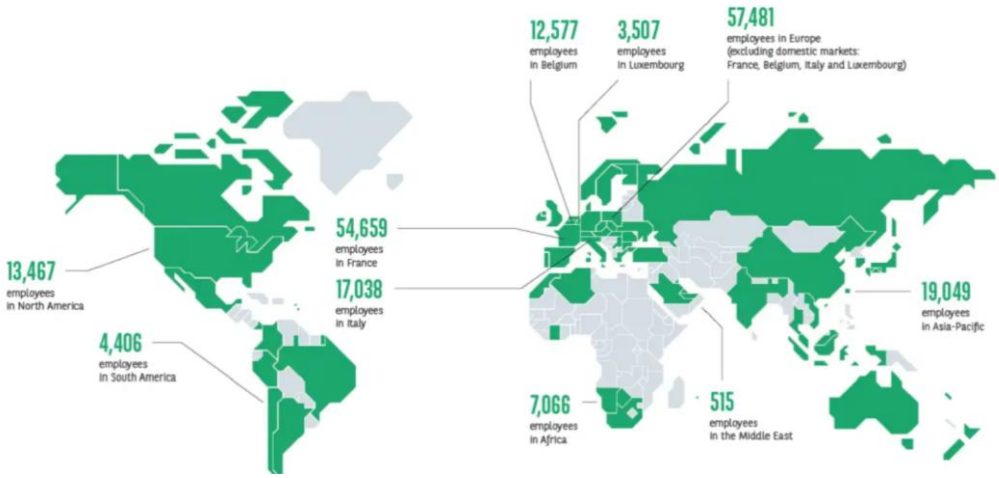

Figure 3.1 – BNP Paribas Worldwide presence

Source: BNP Paribas

Quoting BNP Paribas (2023) website, BNP Paribas mission is "to contribute to a responsible and sustainable economy by financing and advising clients according to the highest ethical standards". It holds leading positions in its three major operating divisions:

- Commercial, Personal Banking & Services for all the Group's retail banking networks and several specialized businesses, including BNP Paribas Personal Finance and Arval;
- Investment & Protection Services for savings, investment and protection solutions;
- Corporate & Institutional Banking (CIB), which is focused on corporate and institutional clients.

The last operating division is the one where ECS team is. CIB offers capital markets, securities services, financing, treasury, and advisory solutions to corporate, institutional, and public sector clients (please see Figure 3.2). It operates in 53 countries, with 38.000 employes and more than 20.000 clients.

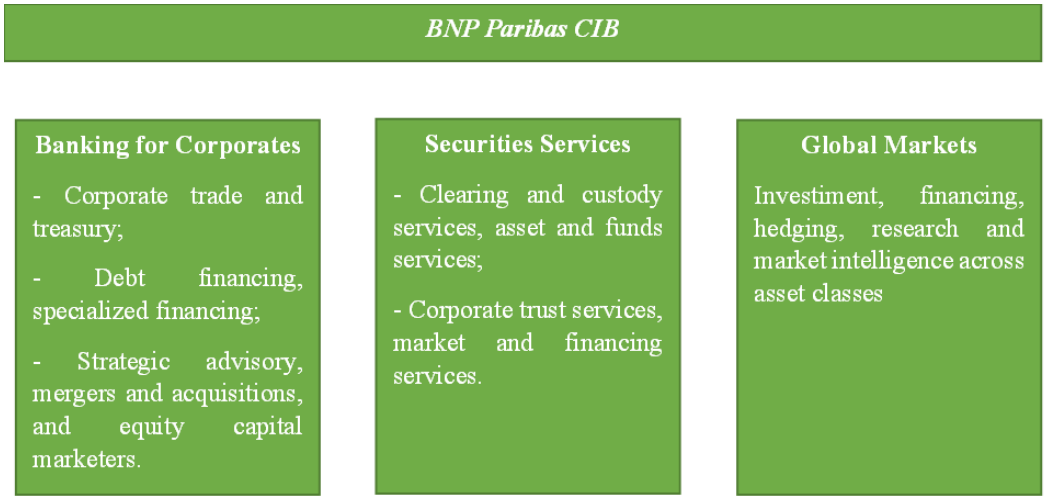

Figure 3.2 – CIB Business Areas

Source: BNP Paribas

Going more into detail, ECS works in CIB's Global Markets (GM) Business Area. The structure of the GM Front Office is distributed into different business lines, listed in Figure 3.3.

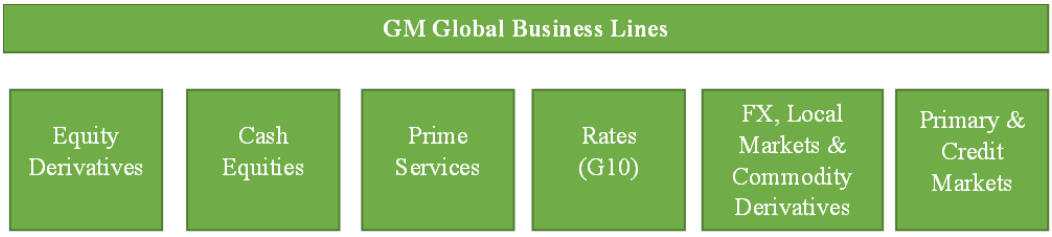

Figure 3.3 – GM Global Business Lines

Source: BNP Paribas

ECS is a global team within GM, based in Paris, Hong Kong, Singapore, London, New York, and Lisbon. It is responsible for providing a single point of contact for Client queries for all BNP Paribas Electronic Products and Services. It is divided into 4 sub teams: Fixed Income & Derivatives, Foreign Exchange (FX), Digital Platforms Distributions, and Smart Derivatives (SD). Its scope includes the following activities:

- Client Enablement, which consists of managing and implementing all Client and User Enablements requests to BNP Paribas electronic trading platforms (e-trading platforms). These include Multi Dealer Platforms (MDPs) and Single Dealer Bank Platform's (SDPs);
- Troubleshoot and resolve issues across all BNP Paribas e-products;
- Monitor the status of all systems and e-trade flows, ensuring clients are connected, being priced, and are able to trade at all times;
- Monitor new clients' activity, follow up on credit and limit issues.

For example, one of ECS team tasks is to help clients get access to the platforms they want to trade and demonstrate to them how the BNP trading platforms are supposed to be used.

The focus of this project is the Client and Contact Enablement activity. There is no report available that monitors that activity, and the goal is to understand how many Enablements are being done by the team, how long it takes to fulfill that process, and which are the points the team needs to improve to optimize their performance.

The selected tool to elaborate this report is Tableau, because it is the one that the company uses the most for this type of analysis. Besides, it allows to freely share reports to different teams, allowing others to know and assess the team's performance in real time.

3.2. Data Understanding

The data gathered for this project comes from an internal platform called Antiphony, via API. Antiphony's main purpose is to enable clients and its contacts to trade BNP products in the different platforms where BNP is present.

An Enablement workflow is processed in the following way: a request is emitted by someone from the sales team in the Antiphony platform, where it must complete a request form. After that, it is up to the ECS, to approve or not the request and enable the contact or client for the requested platform(s). This phase is called the provisioning phase, where there are some stages that must be approved: USER_SETUP, CLIENT_SETUP, GO_LIVE_CHECKS, etc. Once all the stages are approved, the client or contact is enabled, and the workflow ends. In this

scenario, contacts and users mean the same thing, so both denominations are used with the same purpose throughout the writing of this document.

Using Python, a script was written that calls out the data from 3 different APIs from Antiphony and merges the data from them in one data frame, in order to create the datasource (Tableau term for database) that is going to be deployed to Tableau. The APIs gathers data from the "Approvals", which is where the enablement requests are approved by the different counterparties (sales team and ECS team); "CRM", which holds information about the clients and its users and; "Workflow", that enlarges all the steps necessary to enable a client and/or a user. The datasource created was called "AntiphonyWorkflowView". Additionally, another datasource previously created was also used in this report, called "Telemetrylight.refogemployee", that gives information about BNP employees. The datasources were linked using the variable "Sso", present in both.

In the first datasource, the data obtained goes from the beginning of 2018 and it is updated daily. It has 99 variables, but only 16 are being used for this project. The second datasource has information from the beginning of 2016 and it is also updated daily. It has 34 variables, but only 1 variable was used. For this report, the timeframe analyzed is between 2021 and 2022.

The following table is the data dictionary of all the variables included in the Dashboards. It lists the datasource the variables are part of, its name, a small description, and the variable type.

Table 3.1 – Data Dictionary

DataSource	Table	Name	Description	Type
Antiphony WorkflowView	Approval	actionType	APPROVAL or PROVISIONING	Text
	Approval	App Key	platform name key	Text
	Approval	approval_status	COMPLETED or WAITING FOR APPROVAL	Text
	Approval	Completed TimeStamp	Date when each stage on the workflow was completed	Date
	Approval	Decision	APROVED, CANCELED, DENIED or PENDING	Text
	Approval	entityType	USER or CLIENT	Text
	Approval	ProcessInstanceId	ID that is generated when an enablement process is initiated	Text
	Approval	Request Received Date	Date when the request was emitted	Date
	Approval	Sso	Internal ID of a BNP employee	Text

(Table 3.1 – continued)

Antiphony WorkflowView	Approval	Stage	Different steps that need approval in an enablement workflow	Text
	CRM	CRM_CLIENT_COUNTRY	Client's country name	Country/ Region
	CRM	CRM_CLIENT_NAME	Client's name in CRM	Text
	CRM	CRM_CONTACT_COUNTRY	Client's user country name	Country/ Region
	CRM	CRM_CONTACT_BUSINESS_EMAIL	Email of a client's user/contact	Text
	Workflow	End Date	Date when the workflow was closed	Date
	Workflow	product.PRD-01001.clientRegion	Client's region (AMER, APAC or EMEA)	Country/ Region
Telemetrylight. refogemployee	Refog	FullName	BNP employee's full name	Text

3.3. Data Preparation

In this phase of CRISP-DM methodology, it was discussed with the team members what were the KPIs to include in the Dashboard. This was the initial KPIs list decided by them:

- Client's Location;
- User's Location;
- Time response by the team;
- Client's Enablements, by platform;
- User's Enablements, by platform.

3.3.1. 1st Iteration

As the report was being built, other KPIs were surging, such as top 10 countries with most users, top 10 countries with most clients, client's distribution by region, user's distribution by region, and number of Enablements by platform, or by entity type (user or client), comparing the ones made in 2022 with 2021.

For that, a Dashboard entitled Clients & Users Dashboard was created, with the following KPIs: Client's Location, Top 10 Clients, Client's Enablements by Region, Contact's Location, Top 10 Contacts, Contacts Enablements by Region, Enablements by Platform, Enablements by Entity Type, Total Enablements, Total Users & Clients (please see Table 3.3). To achieve the proposed KPIs, additional calculations were necessary, resulting in the creation of 4 new variables (see Table 3.2).

Table 3.2 – Additional Calculated Fields: 1st Iteration

Datasource	Name	Description	Formula	Type
Antiphony WorkflowView	Contact Region	Region of each's contact/user: EMEA, AMER or APAC	Groups the CRM_CONTACT_COUNTRY variable by region	Text
	Platforms	It gives a new platform name, based on the distinction between an external and internal platform. There 9 platforms in total	IF [AppKey] = "platform" THEN "IP1" (…) END	Text
	Platform Type	Type of each platform: Internal or External	Groups AppKey variable by external and internal platforms	Text
	Top 10	Returns the top 10 lines	INDEX() <= 10	T/F
	Top 10 Client Countries	It categorizes a country based on its region and ranking	IF [CRM_CLIENT_COUNTRY] = "country" THEN "C1AMER" (…) END	Text
	Top 10 Contact Countries	It categorizes a country based on its region and ranking	IF [CRM_CONTACT_COUNTRY] = "country" THEN "C1EMEA" (…) END	Text

Table 3.3 – Clients & Users Dashboard KPIs: 1st Iteration

KPI	Visualization	Formula	Filters	Source
Client's Enablement by Region	Pie Chart	1st: Count distinct of processInstanceId variable 2nd: divide enablements by region by the total of enablements	End Date: 2022 EntityType: CLIENT Appkey: 9 platforms approval_status: COMPLETED actionType: PROVISIONING productPRD-01001.clientRegion: exclude Null values	BNP Paribas
Client's Location	Diagrammatic cartogram	Count distinct of CRM_CLIENT_NAME by CRM_CLIENT_COUNTRY	Appkey: 9 platforms CRM_CLIENT_NAME: exclude Null values	BNP Paribas
Contact's Enablement by Region	Pie Chart	1st: Count distinct of processInstanceId variable 2nd: divide enablements by region by the total of enablements	End Date: 2022 EntityType: USER Appkey: 9 platforms approval_status: COMPLETED actionType: PROVISIONING contact region: AMER, APAC, EMEA	BNP Paribas
Contact's Location	Diagrammatic cartogram	Count distinct of CRM_CONTACT_BUSINESS_EMAIL by CRM_CONTACT_COUNTRY	Appkey: 9 platforms CRM_CLIENT_NAME: exclude Null values	BNP Paribas

(Table 3.3 – continued)

Enablements by Entity Type	Bar Chart	Count disctint of processInstanceId variable by selected platforms	End Date: 2022 EntityType: CLIENT, USER or both Appkey: 9 platforms approval_status: COMPLETED actionType: PROVISIONING Decision: APPROVED Stage: 5 out of 24 Sso: team members (9 in total)	BNP Paribas
Enablements by Platform	Bar Chart	Count distinct of processInstanceId variable by selected platforms and by year	End Date: 2021 and 2022 EntityType: CLIENT, USER or both Appkey: 9 platforms approval_status: COMPLETED actionType: PROVISIONING Decision: APPROVED Stage: 5 out of 24	BNP Paribas
Top 10 Clients	Table	1st: Count distinct of CRM_CLIENNT_NAME by CRM_CLIENT_COUNTRY 2nd: filter the top 10 countries with the most clients	Appkey: 9 platforms CRM_CLIENT_NAME: exclude Null values Top 10: True	BNP Paribas
Top 10 Contacts	Table	1st: Count distinct of CRM_CONTACT_BUSINESSEMAIL by CRM_CONTACT_COUNTRY 2nd: filter the top 10 countries with the most contacts	Appkey: 9 platforms CRM_CLIENT_NAME: exclude Null values Top 10: True	BNP Paribas
Total Enablements	Table	Count distinct of processInstanceId variable by year	End Date: 2021 and 2022 EntityType: CLIENT, USER or both Appkey: 9 platforms approval_status: COMPLETED actionType: PROVISIONING Decision: APPROVED Stage: 5 out of 24 Sso: team members (9 in total)	BNP Paribas
Total Users & Clients	Table	Count distinct of processInstanceId variable by year and by entity type	End Date: 2021 and 2022 EntityType: CLIENT and USER Platform Type: Internal and External approval_status: COMPLETED actionType: PROVISIONING Decision: APPROVED Stage: 5 out of 24 Sso: team members (9 in total)	BNP Paribas

3.3.2. 2nd Iteration

Since all the KPIs were related to clients and users', apart from the KPI "time response by the team", it was decided to analyze that one from three different perspectives: monthly average time of response, distribution of days of response, and monthly days of response (which is the number of days each enablement process takes to be completed on a monthly basis). This separation led to a second Dashboard: Time Response.

In the Time Response Dashboard, 3 KPIs were obtained: Average Response Time, Annual Days of Response, and Monthly Days of Response (please see Table 3.5). The goal of these metrics is to understand if the team is fulfilling the time policy, which is: when there is an enablement to be approved on an internal platform, it needs to be done under 24 hours; when it is on an external platform, it must be done under 48 hours. To get this information, two additional variables were created, listed in Table 3.4.

Table 3.4 – Additional Calculated Fields: 2nd Iteration

Datasource	Name	Description	Formula	Type
Antiphony WorkflowView	Stage Duration	Number of days it takes to complete a stage	ROUND(DATE([Completed Timestamp]) - DATE([Resquest Received Date Time]), 0)	Number
	Days of Response	It categorizes the stage duration in 0, 1, 2 and >2 (days)	IF [Stage Duration] = 0 THEN "0" ELSEIF [Stage Duration] = 1 THEN "1" ELSEIF [Stage Duration] = 2 THEN "2" ELSEIF [Stage Duration] > 2 THEN ">2" END	Text

Table 3.5 – Time Response Dashboard KPIs: 2nd Iteration

KPI	Visualization	Formula	Filters	Source
Annual Days of Response	Pie Chart	1st: Count disctint of processInstanceId variable 2nd: divide enablements by days of response by the total of enablements	End Date: 2022 EntityType: CLIENT, USER or both Appkey: 9 platforms approval_status: COMPLETED actionType: PROVISIONING Sso: team members (9 in total) Decision: APPROVED Stage: 5 out of 24	BNP Paribas

(Table 3.5 – continued)

Monthly Average Response Time	Circle Chart	Average days of response per enablement for each month of the year	End Date: 2022 EntityType: CLIENT, USER or both Appkey: 9 platforms approval_status: COMPLETED actionType: PROVISIONING Sso: team members (9 in total) Decision: APPROVED Stage: 5 out of 24	BNP Paribas
Monthly Days of Response	Bar Chart	1st: Count disctint of processInstanceId variable 2nd: group enablements by days of response on a monthly basis	End Date: 2022 EntityType: CLIENT, USER or both Appkey: 9 platforms approval_status: COMPLETED actionType: PROVISIONING Sso: team members (9 in total) Decision: APPROVED Stage: 5 out of 24	BNP Paribas

CHAPTER 4

Results

In this chapter, the Modeling, Evaluation, and Deployment phases of CRISP-DM methodology are presented. The Modeling phase consisted of iterating the KPIs and Dashboards to find the best way to present them and optimize their usage by ECS team. The Evaluation phase was assessing among the team members the utility and efficiency of the Dashboards, through a questionary. Finally, the Deployment phase involved making the Dashboard available for the team but also other teams and managers that are interested in the team's performance in the Clients and Users Enablement process for trading platforms.

4.1. Modeling

4.1.1. Results from 1st Iteration

As can be observed in the next page (Figure 4.1), the Dashboard is read from left to right, having on the top KPIs related to clients and in the bottom KPIs related to users. Then we have two bigger graphs related to the number of Enablements by platform, comparing 2022 to 2021, and another where it looks at its evolution throughout 2022. Finally, there are two small tables that give a general overview of the Enablements done in total and by entity type.

The filter on the top left changes the years on the "Total Enablements", "Total Users & Clients" and "Enablements by Platform". The last filter on the bottom, changes the year for all the other graphs. The "Platform Type" and "EntityType" filter is only applied to "Enablements by Entity Type" graph.

4.1.2. Results from 2nd Iteration

The Dashboard displayed on the second page counting from the current one (Figure 4.2) has 3 filters that are applied to all the graphs: the year (End Date), EntityType and PlatformType. There are two graphs at the top, the one on the left indicates the response time in a month and the one on the right the days distribution of the time response, both in 2022. Lastly, the graph at the bottom shows the time response of each process on a monthly basis, in 2022.

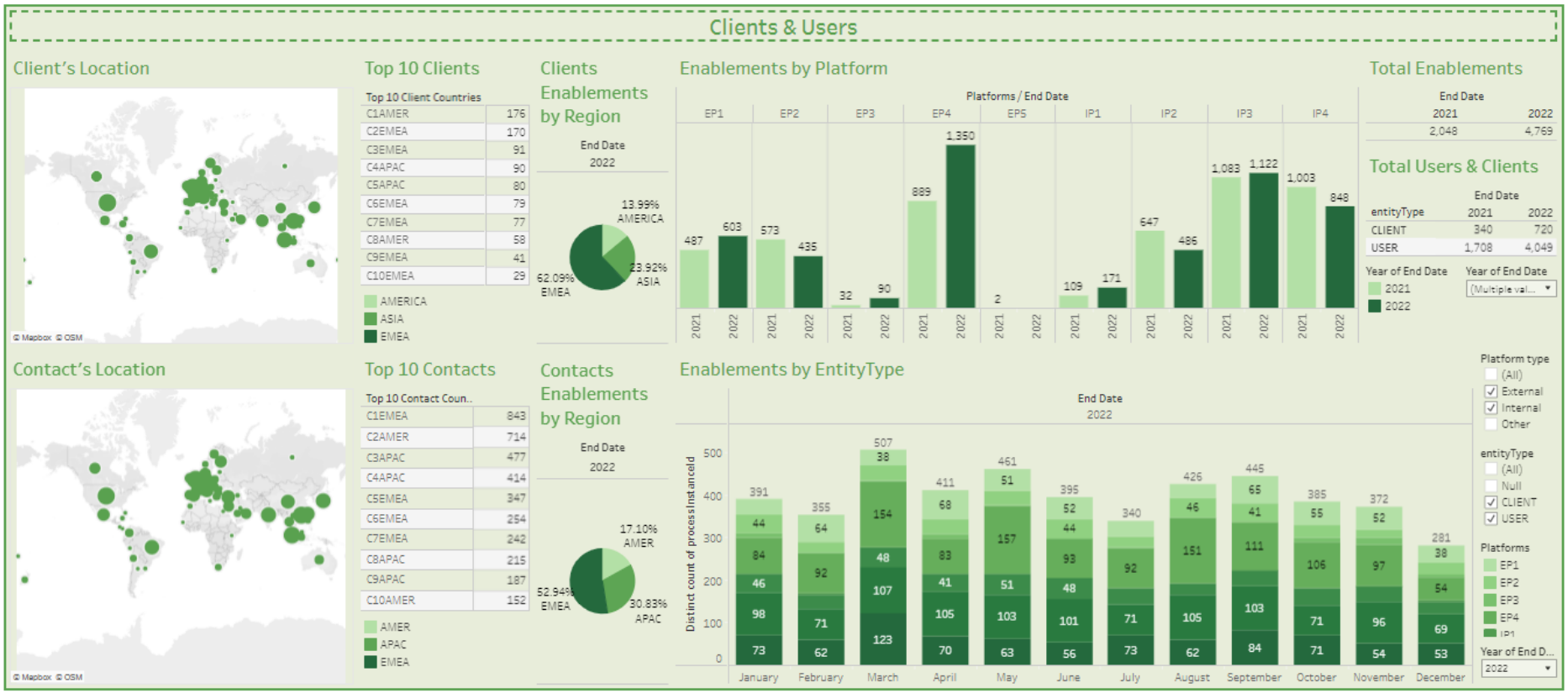

Figure 4.1 – Clients & Users Dashboard, 1st Iteration

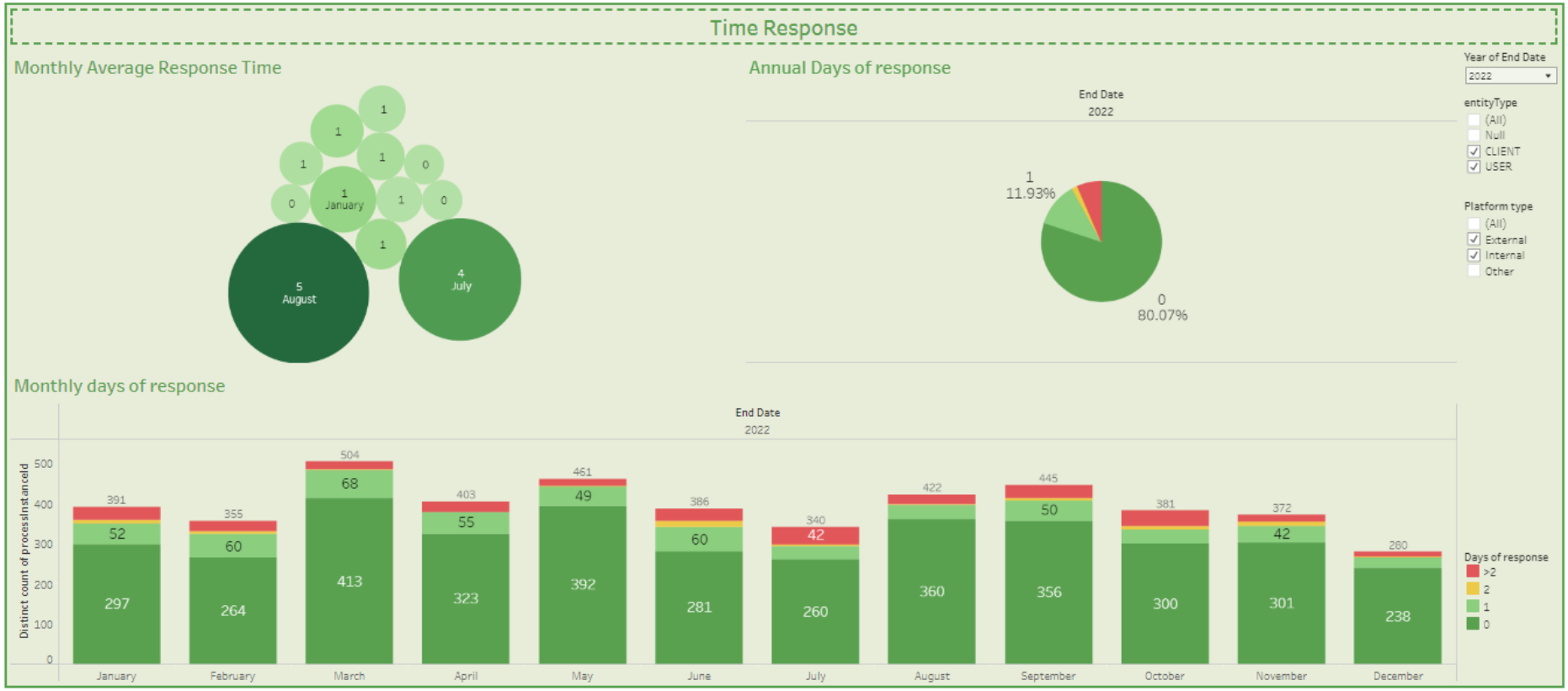

Figure 4.2 – Clients & Users Dashboard, 2nd Iteration

4.2. Dashboards Analysis

In this topic, each graph is analyzed in detail, providing a description of the results presented and implications that they have in the team's business. A total of 13 KPIs are analyzed. This analysis was based on a monthly analysis that one of the team members does and sends it by email to the interested parts.

4.2.1. Clients

This graph shows the distribution of BNP clients around the globe, to get an idea of their demography. As can be observed in Figure 4.3, there are clients across all continents, prominently in Europe. The size of the circles is bigger or smaller according to the number of clients in each country, showing bigger circles in countries in central Europe, southeast Asia, and North America.

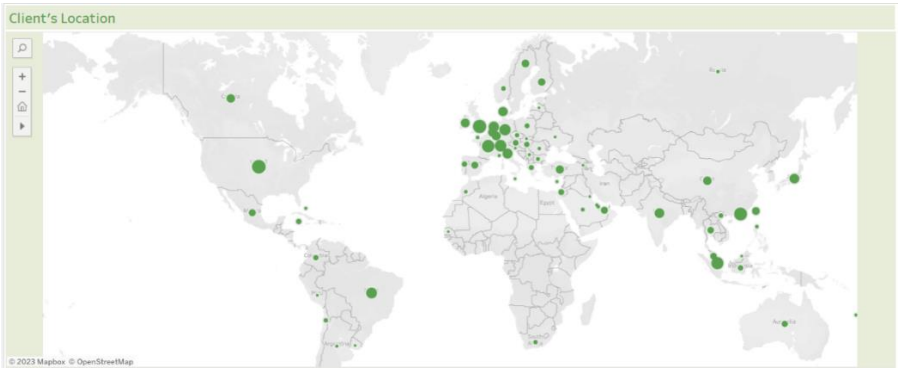

Figure 4.3 – Client's Location

Due to confidentiality reasons, the actual names of the countries had to be substituted by generic names. C+number means the country and the ranking it is in the table and AMER, APAC and EMEA are the possible regions the country is located. Looking at Figure 4.4, the country that has more clients C1AMER, with 176 clients, followed by C2EMEA with 165 clients. Out of 10 countries, 6 countries belong to Europe, Middle East, and Africa (EMEA), 2 belong to Asia-Pacific (APAC) and 2 belong to Americas (AMER).

Top 10 Clients

Top 10 Client Countries	
C1AMER	176
C2EMEA	170
C3EMEA	91
C4APAC	90
C5APAC	80
C6EMEA	79
C7EMEA	77
C8AMER	58
C9EMEA	41
C10EMEA	29

Figure 4.4 – Top 10 Clients

The last graph about clients to analyze is Figure 4.5 that shows the distribution of clients per region. Almost 2/3 BNP clients are in EMEA, about 14% are in AMER and roughly 24% are in APAC. This distribution is aligned with BNP influence around the world, being predominant in EMEA, then in APAC, and lastly in AMER.

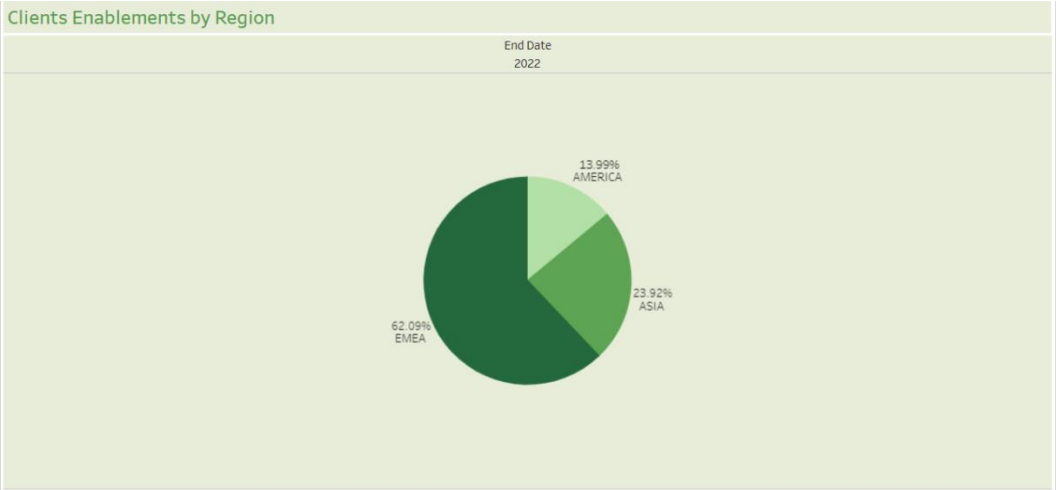

Figure 4.5 – Clients Enablements by Region

4.2.2. Contacts

This graph (Figure 4.6) shows the distribution of BNP contacts around the globe. As previously mentioned, each client has a set of contacts, so the numbers of contacts are higher than the clients. The contact's distribution is very similar to the clients, where they are spread over all continents, having higher numbers in Europe, southeast Asia, and North America.

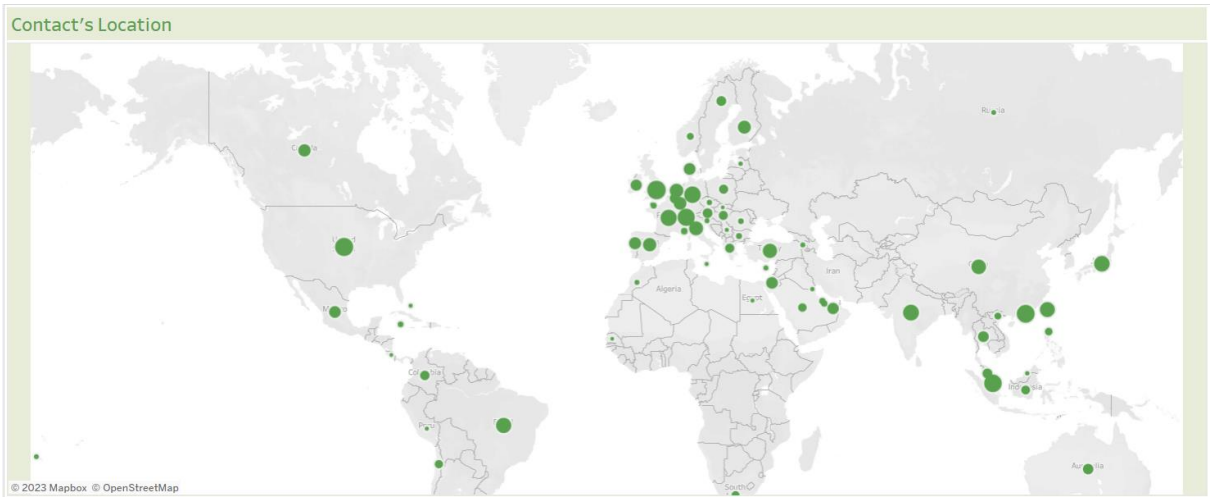

Figure 4.6 – Contact's Location

For the same reasons previously mentioned, contacts country names cannot be disclosed, so they had to be substituted by generic names. In Figure 4.7, the top 10 countries with most

contacts are very similar to clients, but this time C1EMEA is in first place with 843 contacts, followed by the C2AMER with 714, which is a bigger difference compared to the difference between the same countries in the clients' table. In this table, 4 countries are part of EMEA, 4 are in APAC and 2 in AMER.

Top 10 Contacts

Top 10 Contact Countries	
C1EMEA	843
C2AMER	714
C3APAC	477
C4APAC	414
C5EMEA	347
C6EMEA	254
C7EMEA	242
C8APAC	215
C9APAC	187
C10AMER	152

Figure 4.7 – Top 10 Contacts

Looking at the contacts distributions by regions (Figure 4.8), around 53% are in EMEA, 31% in APAC and 17% in AMER. Here contacts distribution is slightly more balanced, but it still shows that most of BNP business is done in EMEA.

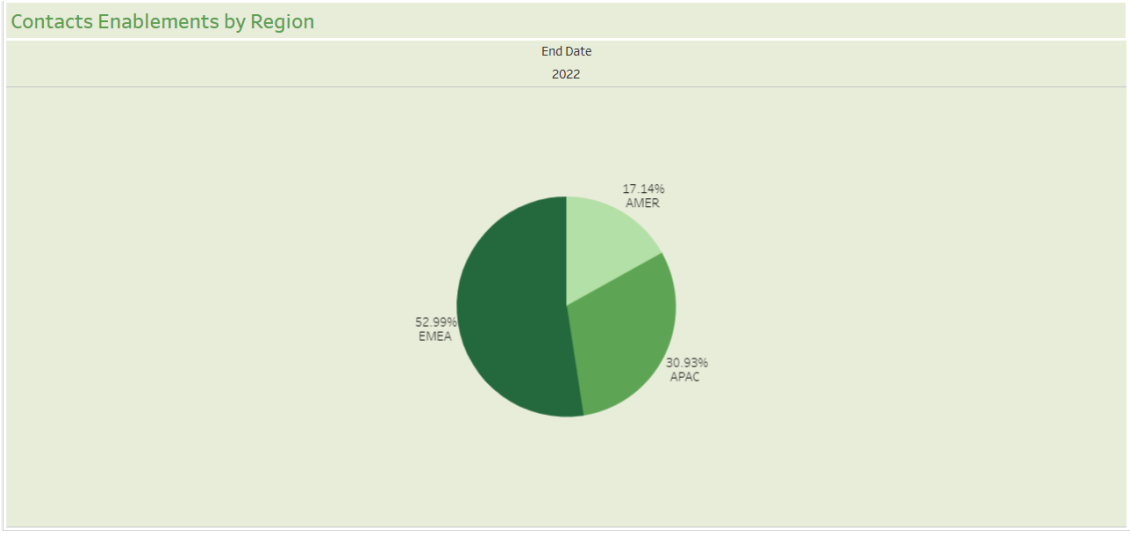

Figure 4.8 – Contacts Enablements by Region

4.2.3. Enablements

In terms of Enablements, there were performed a total of 2,048 Enablements in 2021 and 4,769 Enablements in 2022, which corresponds to an increment of 132.86% (Figure 4.9).

Total Enablements

End Date	
2021	2022
2,048	4,769

Figure 4.9 – Total Enablements

Analyzing these numbers in more detail (Figure 4.10), from the 2,048 Enablements done in 2021, 340 were from Clients and 1,708 from Users. In 2022, 720 Clients were enabled, which corresponds to an 111.76% increase. When it comes to Users, 4,049 were enabled in 2022, which is a 137.06% increment.

Total Users & Clients

	End Date	
entityType	2021	2022
CLIENT	340	720
USER	1,708	4,049

Figure 4.10 – Total Users & Clients

The next graph (Figure 4.11) showcases how many Enablements were completed per platform. Due to confidentiality reasons, the actual names of the platforms had to be substituted by generic names. IP stands for Internal Platform (monitored by BNP) and EP stands for External Platform (BNP trades there but does not manage them). There are a total of 9 platforms. It can be observed that, both in 2021 and 2022, the platform with the most Enablements was EP4, registering and increment of 51.9%. Most of the platforms had an increment in Enablements, apart from EP2 (-24.1% compared to 2021), IP2 (-24.9%) and IP4 (-15.5%). Having an external platform as the leading trading platform to enable clients and users to trade financial products is something that BNP needs to work on.

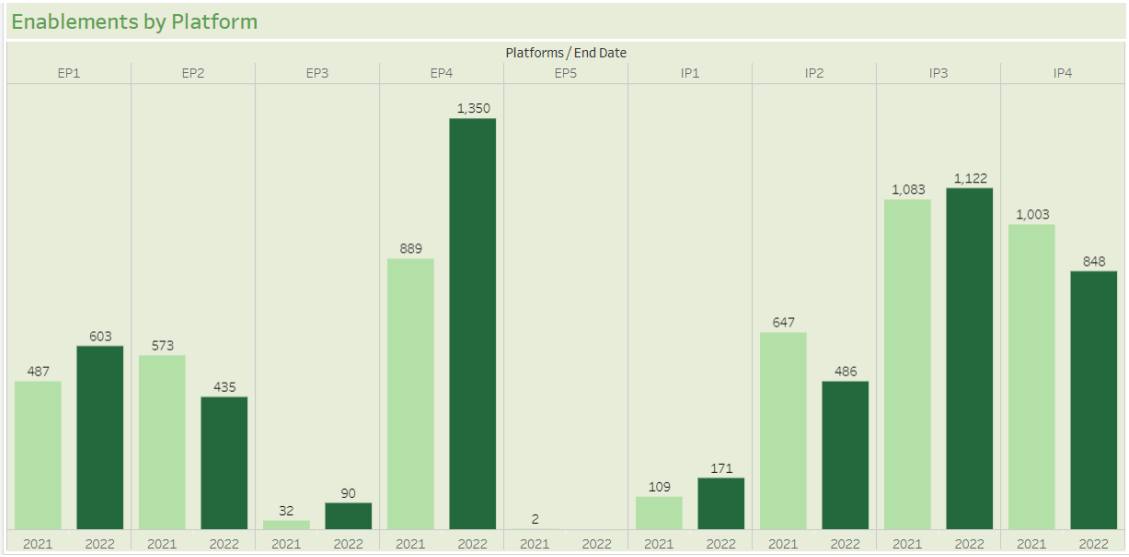

Figure 4.11 – Enablements by Platform

Figure 4.12 shows the evolution of Enablements by each platform in 2022. The month with the most Enablements was March, with 507 Enablements, and it was the only month passing the 500 mark. The month with less Enablements was December, with 281 Enablements. That can be explained by being the end of the year and most employees take holidays during that time. Another interesting thing to take into consideration is that, on a monthly basis, the platform with most Enablements changes between IP3 and EP4: in January it was IP3 with 98 Enablements, in February it was EP4 with 92, in March it was EP4 with 154, in April it was IP3 with 105, in May it was EP4 with 157, in June it was IP3 with 101, and from then on was always EP4, apart from December when IP3 surpassed EP4 one last time. Finally, the number of Enablements was always between 300 and 500 monthly, apart from the month of December.

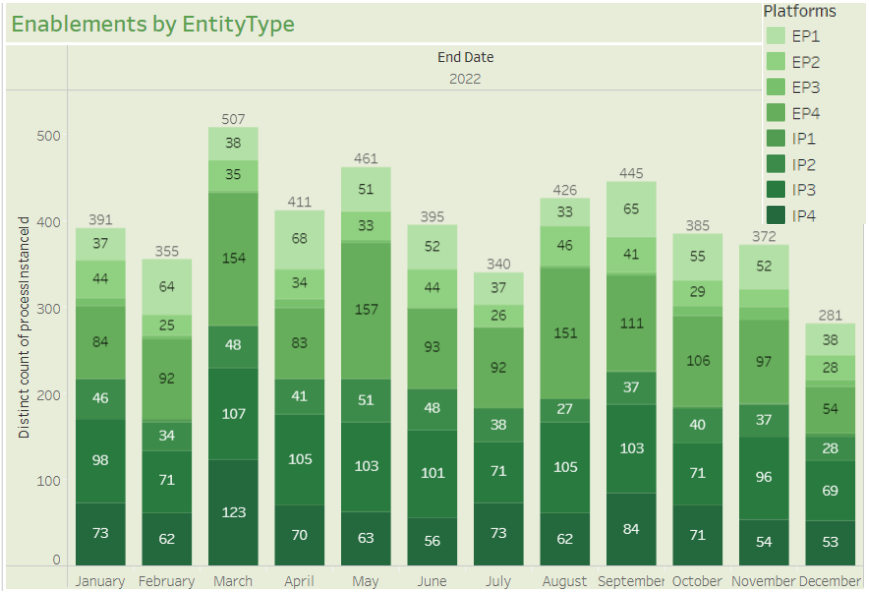

Figure 4.12 – Enablements by Entity Type

4.2.4. Time Response

When it comes to analyzing the time response (how many days it takes to complete an Enablement process), there are three graphs: monthly average time response, annual time response and monthly time response. First, the analysis will be in general and then it will be divided into external platforms and internal platforms. As previously mentioned, an Enablement for an internal platform should take less than 24 hours (between 0-1 days) to complete and an enablement for an external platform should take less than 48 hours (between 0-2 days).

In general, according to Figure 4.13, in most of the months that request was accomplished. However, in July and August, the average time response was 4 and 5 days, respectively. There are three possible reasons: the first one being the months where people go on holidays and having less staff increments the time response, the second reason being that some processes are submitted on Friday (last week day) and are only approved on Monday (first week day), resulting in taking longer than 48 hours to complete, and lastly the fact that some requests cannot be approved straight away and have to go back and forth in order to have all the requirements needed for the user or client to be enabled.

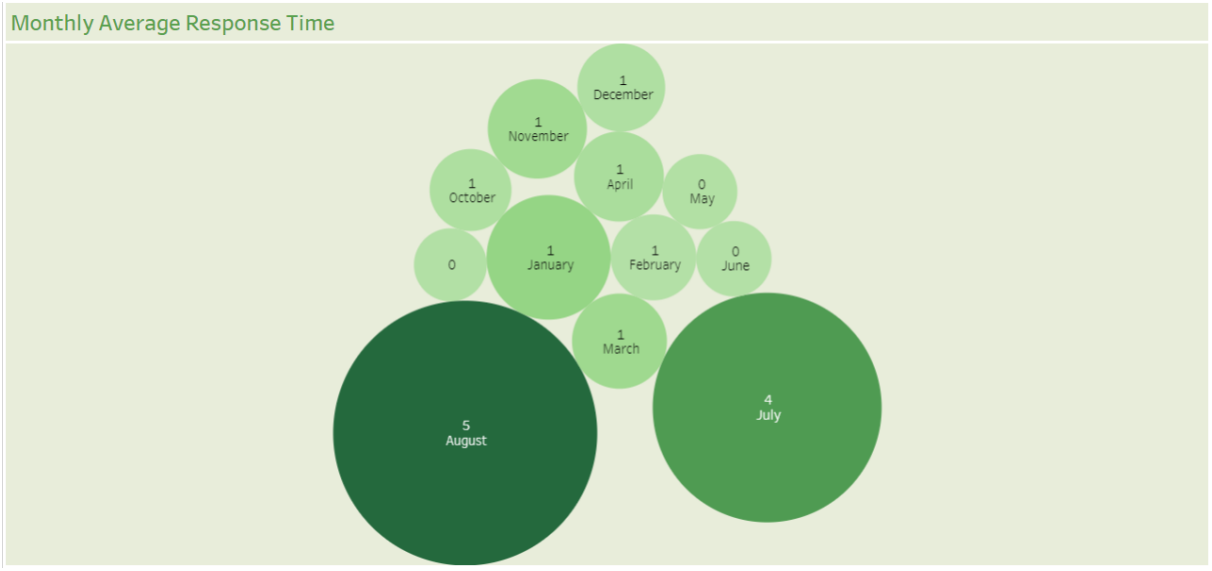

Figure 4.13 – Monthly Average Time Response

Looking at the annual distribution (Figure 4.14), it shows positive results: 80.07% of the Enablements took 0 days, 11.93% took 1 day, 1.52% took 2 days and 6.47% took more than 2 days.

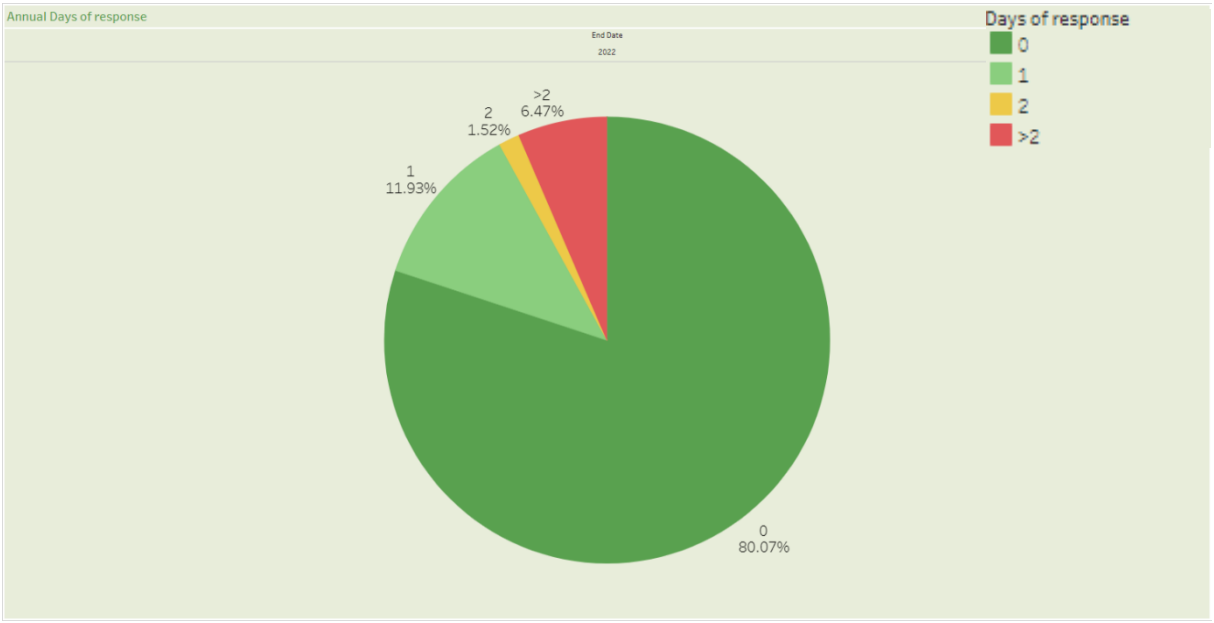

Figure 4.14 – Annual Days of Response

Looking at a monthly perspective (Figure 4.15), the results are very coherent with the annual distribution, which means there was not any atypical month. The more critical cases were in July and October, where the number of Enablement processes that surpassed the 2 days mark were more than 40.

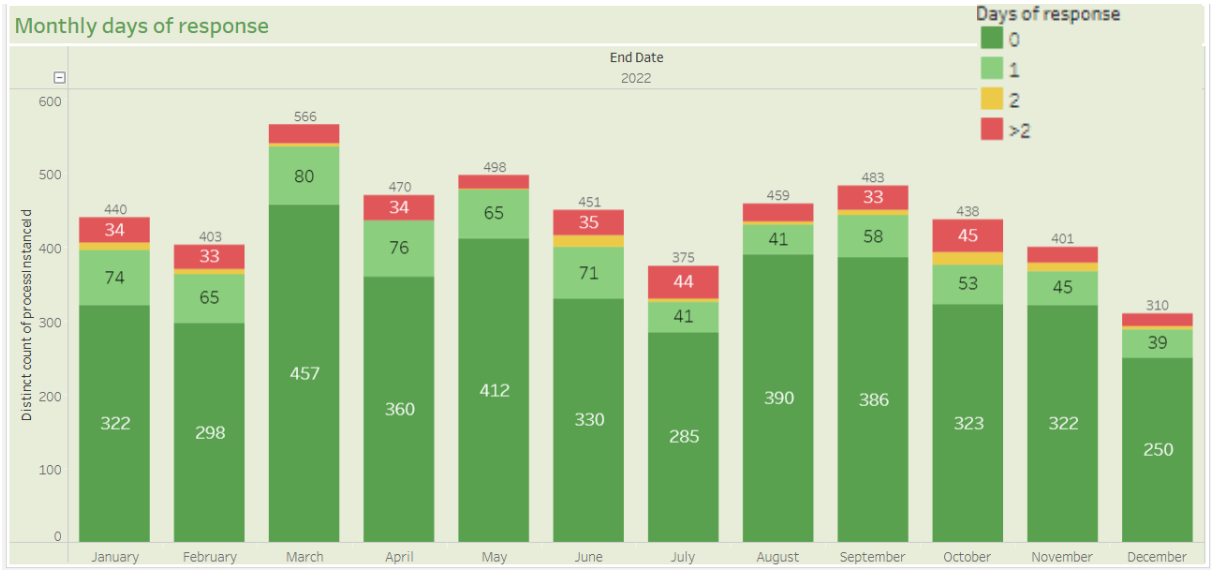

Figure 4.15 – Monthly Days of Response

Focusing on the Enablements that were approved for external platforms (Figure 4.16), the results are very positive: in all the months, the average number of days an Enablement took to be processed was between 0-1 days.

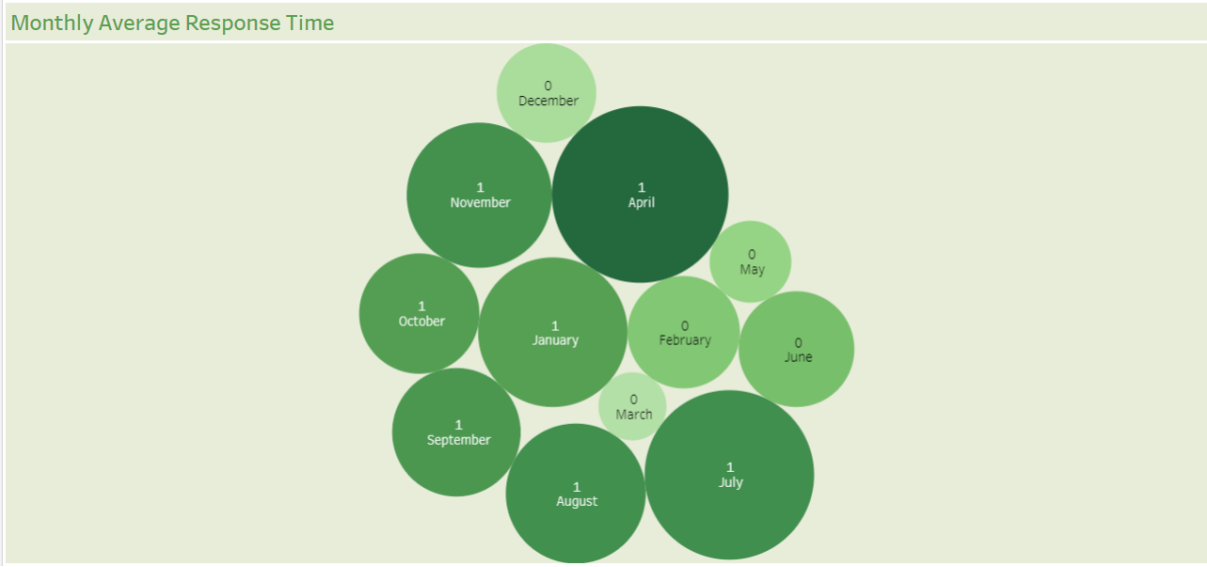

Figure 4.16 – Monthly Average Response Time for External Platforms

The annual distribution of those Enablements in terms of how many days it took to complete also presents favorable results: almost 85% of the Enablements took 0 days (Figure 4.17).

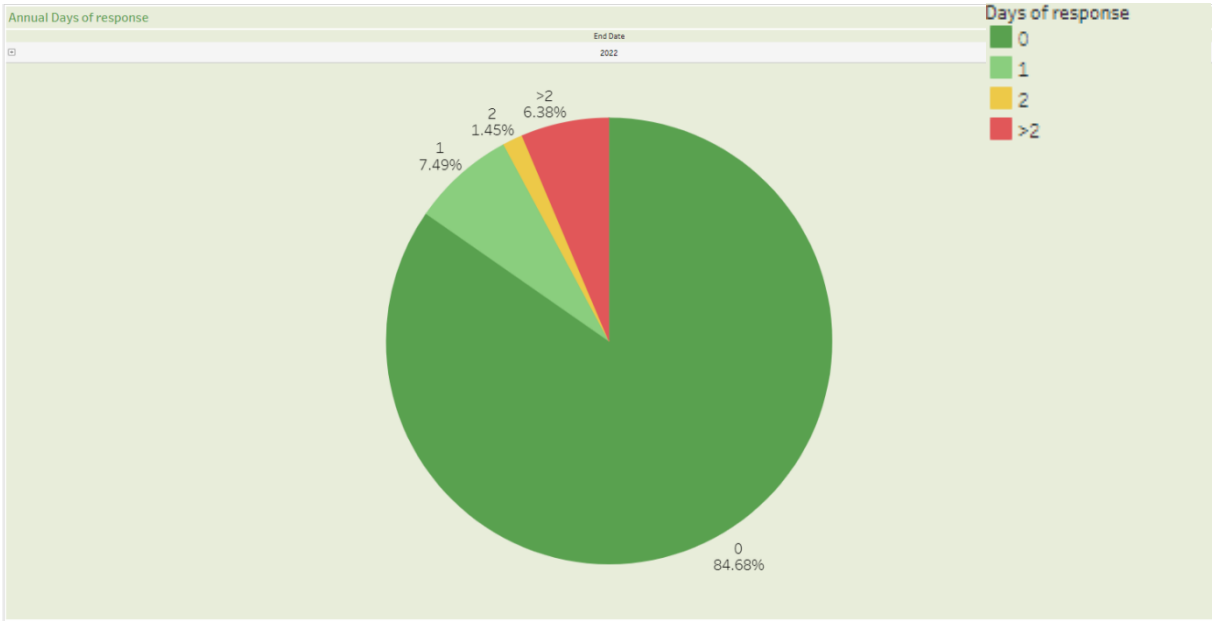

Figure 4.17 – Annual Days of Response for External Platforms

On a monthly basis, the same results are verified: most of the Enablements took 0 to 1 days to be completed and only in the months of July and October, the response time per number of Enablements was slightly higher (please see Figure 4.18).

Figure 4.18 – Monthly Days of Response for External Platforms

Finally, focusing on Enablements executed for Internal Platforms (Figure 4.19), the results are not as good: in August, the average number of days is 8, which is extremely high, and in July it was 5 days. The reasons for that can be the same pointed out before, however it is concerning that Enablements for internal platforms take longer to complete than for external platforms.

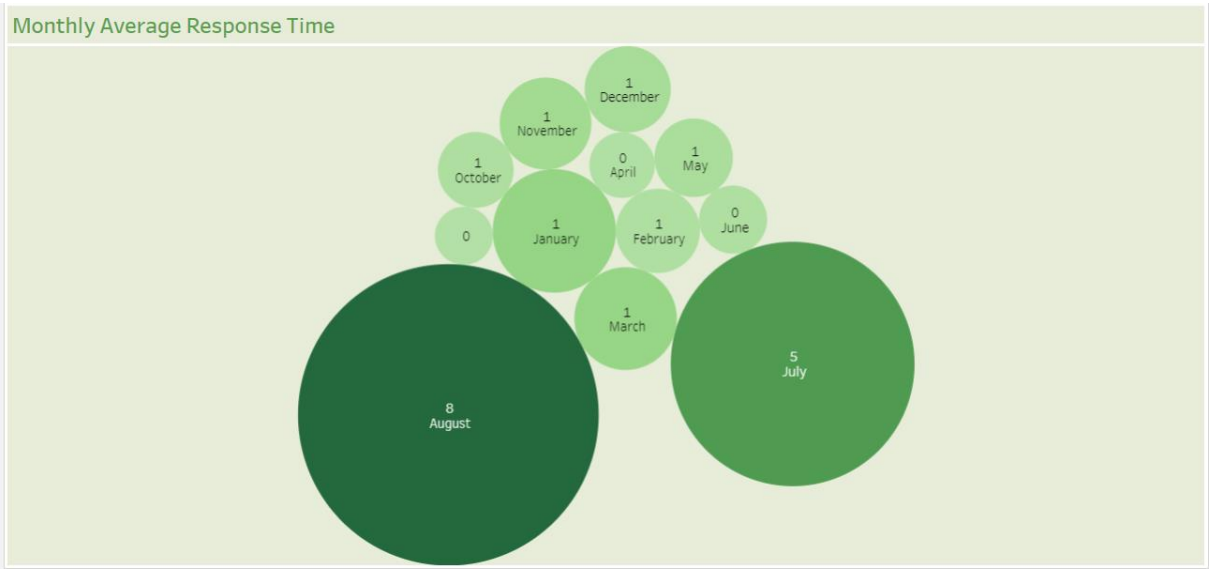

Figure 4.19 - Monthly Average Response Time for Internal Platforms

Regarding the annual distribution (Figure 4.20), 75.55% of Enablements took 0 days. However, the percentage of Enablements that took 2 or more days is still similar to the other cases.

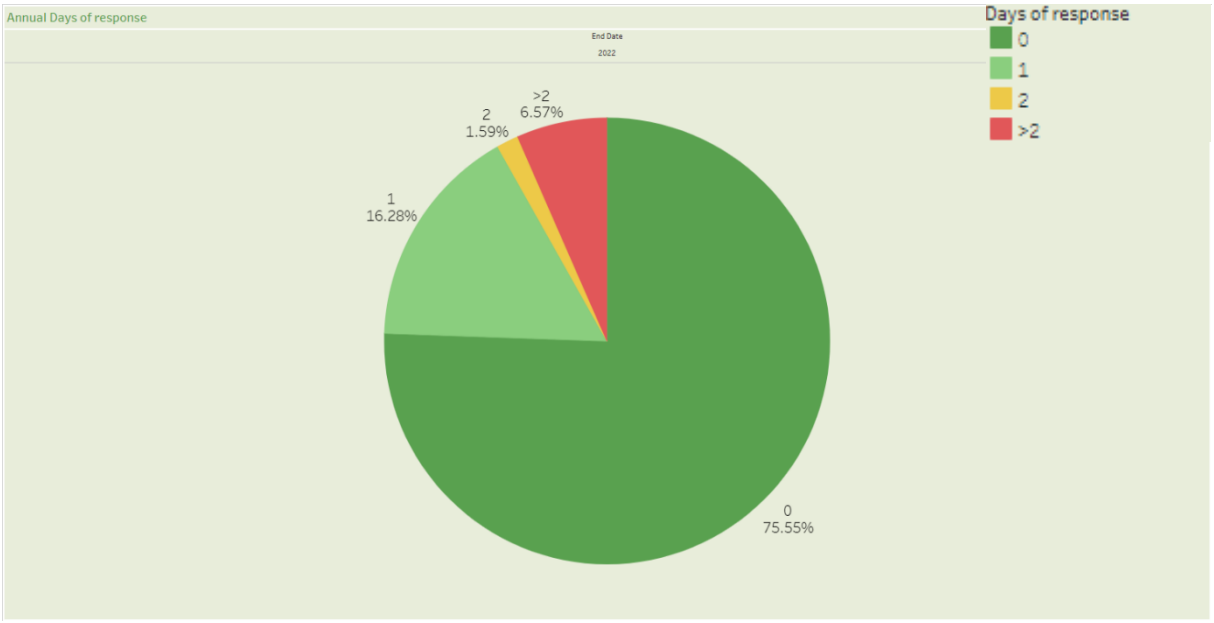

Figure 4.20 – Annual Days of Response for Internal Platforms

Lastly, analyzing the time each Enablement took to be completed on a monthly basis (Figure 4.21), the only observation out of the ordinary is that in June a significant amount of Enablements took 2 days to be completed. For Internal Platforms, 2 days is already concerning since it should take less than 24 hours to be completed (0-1 days).

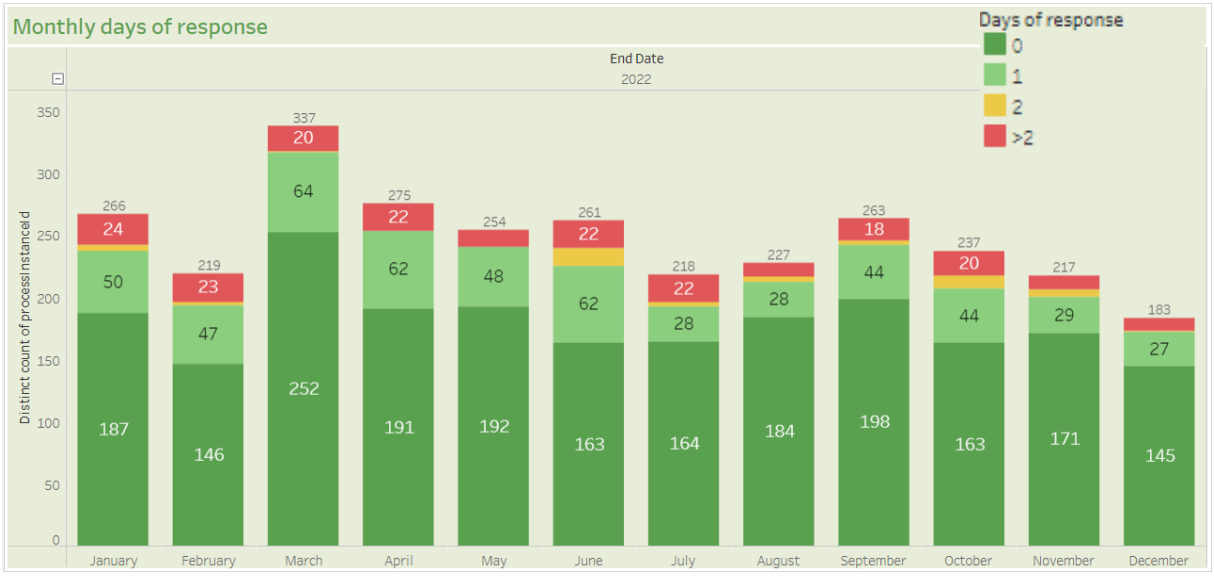

Figure 4.21 – Monthly Days of Response for Internal Platforms

To summarize the analyzed results, the overall picture has a positive outcome, however, the team needs to improve their response time, especially for internal platforms, and must push for more Enablements on those platforms.

4.3. Evaluation

In this phase, a survey was conducted to the team members to assess their opinion about the Dashboards, being answered by 6 people. The survey has 13 questions, divided into 4 groups: 3 of the groups are Likert scale questions, and the last group is an open question to inquire their opinion (please see Table 4.1).

Table 4.1 – ECS team Enablement Report Survey

Group 1	**How useful are the dashboards to monitor:**	**(On a scale from 1 - Not useful to 5 - Extremely useful)**
1	Enablements Performance	4 - Somewhat useful: 33,3% 5 - Extremely useful: 66,6%
2	Clients Enablements	4 - Somewhat useful: 18,7% 5 - Extremely useful: 83,3%
3	Contacts Enablements	4 - Somewhat useful: 18,7% 5 - Extremely useful: 83,3%
4	Enablements by Platform	4 - Somewhat useful: 50% 5 - Extremely useful: 50%
5	Duration of an Enablement Process	2 - Somewhat not useful: 16,7% 3 - Neutral: 16,7% 5 - Extremely useful: 66,7%
Group 2	**How much do you agree about the layout of the dashboards:**	**(On a scale from 1 - Completely disagree to 5 - Completely agree)**
6	Easy to read	4 - Somehow agree: 50% 5 - Completely agree: 50%
7	Type of graphs being suitable for each KPI	4 - Somehow agree: 18,7% 5 - Completely agree: 83,3%
8	Color palette	3 - Neutral: 16,7% 4 - Somehow agree: 50% 5 - Completely agree: 33,3%
9	KPIs placement	4 - Somehow agree: 50% 5 - Completely agree: 50%
Group 3	**What is your opinion for the following statements:**	**(On a scale from 1 - Completely disagree to 5 - Completely agree)**
10	"The dashboards contain the necessary information."	3 - Neutral: 16,7% 4 - Somehow agree: 16,7% 5 - Completely agree: 66,7%
11	"The dashboards are clean and aesthetic."	4 - Somehow agree: 50% 5 - Completely agree: 50%
12	"The dashboards are intuitive."	4 - Somehow agree: 50% 5 - Completely agree: 50%
Group 4	**In your opinion, what can be improved/added to the dashboards?**	
13	It was already done, however in some of them there was maybe to much information, it was just a matter of simplifying...however it is something that did not happen in all dashboards, most of them were very good.	
	The layout could be better. In terms of finding relevant information everything was there which was very helpful for reporting purposes.	
	Better color palette, and there is some information that is not needed.	

As can be read by the answers given to the survey, in most of the topics, everyone is satisfied. There are things to improve when it comes to the time response KPIs and the color palette. Looking at the last question, it corroborates those aspects, and adds that the information displayed can be simplified.

4.4. Deployment

The Dashboards were developed under the Tableau Server which means that they are available online for everyone in the company with the required authorization. That makes it easier for anyone to access it at any time. Additionally, they are incorporated in a monthly email sent by one of the team members with the team statistics.

Also, the present paper can be used as a procedure document by the team to understand more in depth how each KPI was calculated and the process behind the creation of the Dashboards.

CHAPTER 5

Conclusion

The goal with this project was to answer the research question: “Using Dashboards as a visualization tool, how can ECS team performance be evaluated when it comes to Clients and its Contacts Enablement process for financial products in electronic platforms and how can this process be optimized?”.

It can be stated that the question has been answered. Researching topics such as Dashboard, KPI, Tableau, and Python, alongside the elaboration of the Literature Review, made possible to obtain a number of scientific articles that contain the necessary knowledge to perform the project at hand.

Then, using the material available from ECS team and the Bank, aligned to the gained knowledge from the Literature Review, resulted in the construction of two Dashboards with a total of 13 KPIs in order to monitor the team’s performance about Client and Contacts Enablement Process for trading platforms.

The analysis that was conducted in the fourth chapter allowed to take solid conclusions about how the Enablement process is going and accentuates certain aspects that need to be optimized. Also, the survey done to ECS team members retrieved a positive result and people seemed satisfied with it.

5.1. Contributions

This project made significant contributions, such as:

- Development of two Dashboards to monitor the performance of the Enablement Process;
- Creation of quantified KPIs that allows to see the number of Enablements done, to which trading Platforms, and how long it took.

This knowledge will allow ECS team to set their own goals and target numbers, as well as being more vigilant of how long it is taking for certain Enablements to be performed. The Dashboards are very dynamic, with a set of filters, that allow to select the timeframe, so it is possible to detect outlier values or results that are not meeting the expectations.

Finally, it is important to state these are the first Dashboards with such detailed information about ECS job about the Enablement process, which can serve as an example for the team in other activities of their scope or even for other team’s reference.

Looking at this project from an academical point of view, this thesis presents a structured and easy process that retrieves data and builds a database using a Python script and, as well as guidelines on how to analyze this type of data in an enterprise environment, using data visualization tools such as Tableau. It can help future investigators on how to structure their projects and how to incorporate these tools together.

5.2. Limitations and Future Work

The limitations signaled during the elaboration of this project are the following:

- There are a lot of incongruencies and misleading data, due to the fact people within the Bank do not fill the request form with the correct information about the Client or Contacts on Antiphony;
- Regarding the Time Response KPIs, it would have been ideal if the time was measured in hours and not in days. Also, it would be better if it was possible to subtract weekend days from the number of days to give a more accurate result;
- According to the survey performed, it is important to improve the color palette and come up with more succinct KPIs;
- The Enablement process is a very complex process with different intermediaries that requires a lot of knowledge about the business, so the person in charge of monitoring these dashboards has to know how Antiphony, Tableau, and the Enablement process works.

For future work, it is important to come up with slightly improved KPIs that showcase similar information in a cleaner way, with a better color palette, find a better way to quantify the Time Response KPIs, and be more vigilant when it comes to insert data about Clients and Contacts on Antiphony.

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