IT ASSET MANAGER

INTERNSHIP REPORT

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ABSTRACT

My internship was focused on the revenue assurance domain: a telecom operator activity based on revenue and cost optimization. The goal of this internship was to solve the billing problems related with one of the Telefónica France´s major customers. The scope of this project was the fixed voice and the LAN services. The origin of these problems was that the database used to issue the invoices was not correctly updated. In essence, the project consisted in to update this database by using the information provided by site surveys done by the Telefónica's technical providers, to analyze the financial impact produced by the modifications, and to present these results to the customer. The main tasks that I developed within this project were related to programming information treatment applications, analyzing the financial impact of the IT assets, and managing the relationship with the customers.

At the same time, I was involved in some other different projects related with other departments of the company such as the Business Technical Consultant and the Vendor departments.

This document explains in great detail the different missions that I have been doing during my internship, focusing on the technical procedure followed to achieve the project´s goals.

RÉSUMÉ

Mon stage de fin d'études porte sur le domaine du « Revenue Assurance »: une activité menée par les opérateurs télécom qui consiste à l'optimisation des revenues et la minimisation des coûts. L'objectif principal de mon stage est de résoudre des problèmes de facturation que l'entreprise a avec un de ses clients majeurs en France. Ce projet est focalisé uniquement sur les services de voix fixe et LAN. L'origine de ces problèmes vient du fait que la base de données utilisée pour produire les factures n'est pas à jour. En résumé, le projet consiste à mettre à jour cette base des données avec les informations fournies par les prestataires techniques de Telefónica, d'analyser l'impact financier des modifications de la base des données, et de gérer la relation avec le client afin de partager avec lui l'avancement du projet.

En même temps, j'ai participé à d'autres projets différents qui m'ont permis d'avoir une vision plus complète des activités qui sont réalisées par des opérateurs télécom. Parmi ces projets j'ai eu l'opportunité de collaborer avec autres départements comme le « Business Technical Consultant » et le « Vendor Management».

Ce document détaille les différentes missions que j'ai réalisées pendant mon stage, en se focalisant spécialement sur les aspects liés à la procédure technique de mise en œuvre.

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1. INTRODUCTION

Telecom Bretagne is a major engineering school based in Brest (France) which encourages their students to get involved in a final bachelor degree internship in order to introduce them to the job market and to provide them a professional experience which allows synthesizing the concepts learned during their student years.

This document constitutes the memory of my final bachelor degree internship, which took place in the telecommunications service provider company Telefónica between March 2014 and September 2014. Within the scope of this document, whose aim is to show in detail the development of my internship, I will explain the context of my internship, the problems to be solved, the knowledge and skills that I used and developed in order to complete my tasks and my personal advice about both my personal and professional growth during the internship.

In my view, it would not be fair to lead off this kind of document without starting from the very beginning: why did I choose this internship? When looking for a final bachelor degree engineering internship in France, there are plenty of opportunities in different sectors and with plenty of different tasks to do, so my choosing criteria was based in three major factors: (1) The task to develop during my internship. Due to my double background in economics and telecommunications engineering, I was looking for an internship which could allow the trainee to develop and practice his skills in both disciplines. (2) The sector of the company and its prestige. In my view, having a first experience within the telecom business sector, especially in big company, offers the opportunity to start a career in a good position. (3) The location. It was important for me, due mainly to personal reasons, to find an internship located in Paris. Finally, once I found the Telefónica internship offer, I realized that it could fit perfectly with my criteria and my motivations.

The main working axe of my internship was focused in the revenue assurance; a telecom operator activity based in revenue and cost optimization, which would be detailed in a specific chapter of this document. The main missions that I developed in this axe were related to programming information treatment applications, updating databases, and managing the relationship with the customers and providers by explaining the results obtained, asking for data details, etc… Nevertheless, in order to adapt my internship to my personal skills and motivations, we accorded with my mentors to expand the scope by adding some different missions related with other departments of the company. This second working axe, composed by short term missions will be called from now on "discovering the telecom operator roles". However, these groups of missions were always related with revenue assurance activities. This fact allowed me to discover step by step the different departments and to understand how costs and revenues are extremely important for almost all the departments and business units of a company.

From this point, this document will explain step by step my experience in Telefónica. The structure of this document is as follows: a first part will be dedicated to introduce the company and the costumer. A second part will describe in detail the two working axes of my internship. Then, I will explain the tools at my disposal to achieve my missions. A fourth part will be dedicated to explain in a great detail the whole group of missions that I developed. Finally I will close this document by a personal conclusion and the acknowledgments.

2. THE COMPANY: TELEFÓNICA

This chapter is reserved to describe the company where I spent the lasts six month doing my internship: Telefónica.

Telefónica is one of the largest telecommunications companies all over the world and one of the telecom services provider company more efficient from the sector in growth and profitability terms [1].

After its set up in Spain on 1924, the company has become the first world company to offer their customers fixed, mobile, data and informatics solutions all over the world [1].

In my view, in order to get in deep to the company analysis and to avoid presenting more company details without knowing the context, it is important to read and understand its mission and vision. On the one hand, the mission of a company gives us a general idea about their purpose and long term objectives. On the other hand, the vision provides us an idea about how the company is going to manage to achieve their objectives and where they want to be positioned in long term.

The Telefónica's mission, which could be found in their website, is resumed in just a short paragraph [2].

"*We are undergoing a social and economic revolution which is unprecedented in the history of mankind, triggered by the possibilities which technology opens up for people. Our mission is to bring those options to all companies and people, so they can live better, do more things and be more*."

From this text, the reader can immediately realize that Telefónica's approach is to offer a group of technologic services to their customers. I would like to enhance that they do not only offer telecom services, but also other services related with technology. When we go deep into the mission of the company, we can find that their work is based in 3 key attitudes:

***Discover*:** the company is focused on the customer, so it is up to Telefónica to discover what digital services the customer needs or could need in the future.

Disrupt: the Telefónica employees work hard day after day to try to anticipate the changes in the digital world. Disrupt means for Telefónica to improve the rules of the game to generate greater value for the company stakeholders.

Deliver: the company takes advantage of their global presence by carrying affordable technology to the people all over the world.

Once the mission of Telefónica has been explained, the next step is to explain the vision. According to Hamel and Prahalad (1990), when analyzing the vision of a company three points have to be found in their definition [7]: (1) The triumph concept should be always implicit in the definition; (2) It has to be consistent and stable in a long term basis; and (3) It has to be ambitious enough to worth the effort and commitment of the stakeholders.

Next, a quick analysis of Telefónica's vision will be done by showing the company's vision which could be found as well in their website:

"*Improving people's lives around the world by transforming possibilities into reality. Building a better future for everyone: our employees, society, shareholders and partners*."

According to the difinition of vision, which establishes that the vision should be more concrete than the mission, we can as well see in Telefónica's website the axes that the company considers fundamental in order to achieve the vision proposed:

- *"Providing our employees with the optimal workspace, showing a firm commitement to talent, and guaranteeing the best opportunities for professional development"*
- *"Placing the customer at the core of everything we do, aiming for their utmost satisfaction with our services and solutions."*
- *"Offereing our shareholders the best combination of growth and profitability in the sector."*
- *"Acting as a driving force behind transformation. Forming an active part of the societies and markets in which we operate, offereing our experience and perspectives as professionals in the telecommunications world. We show the global and local reality exactly as it is, coherently and with commitment, whilst being innovative, open committed and honest in everything we do."*

When analyzing this text, we can easily identify that the three main points proposed by Hamel and Prahalad are implicit in the vision of Telefónica.

As we can deduce from the mission and vision, for a company that works in such a dynamic sector like telecommunications, it is extremely important to be flexible and adaptable to the technical evolutions of the IT sector and the needs of theirs customers.

For these reasons, as Telefónica statutes in their vision, the company considers essential to always offer innovative and quality products to the costumers. It is possible to prove this commitment by analyzing the company's income statement, where more than 4 billion Euros are dedicated to the research and development of new services.

As it has been previously explained, Telefónica is present in many different countries all over the world. Nevertheless, the company uses different brand names depending on the country [4]:

Movistar : this brand name is used for the customers in South America and Spain. Movistar was created in 2005 and it is nowadays one of the company main references.

O2: in the rest of Europe, the most well-known brand name for Telefónica is O2. This brand name is used in United Kingdom, Ireland, Czech Republic, Slovakia and Germany.

Vivo: services of fixed voice, mobile, data and television are offered by Telefónica in Brazil. The Telefónica's brand name in Brazil is Vivo.

FIGURE 1 - TELEFONICA BRANDS

When analyzing the organization structure of a company, it can be described as a tall or flat organization structure. This classification refers to the levels of management in the organization's hierarchy and the distance existing between the top board's directors and the employees. In the case of Telefónica we can affirm that the company is organized following a tall structure, with different management levels. The organization chart, which is a really helpful tool to understand a company structure, allows us to prove that Telefónica is using a tall organization structure. The next image is the current organization chart of Telefónica [5].

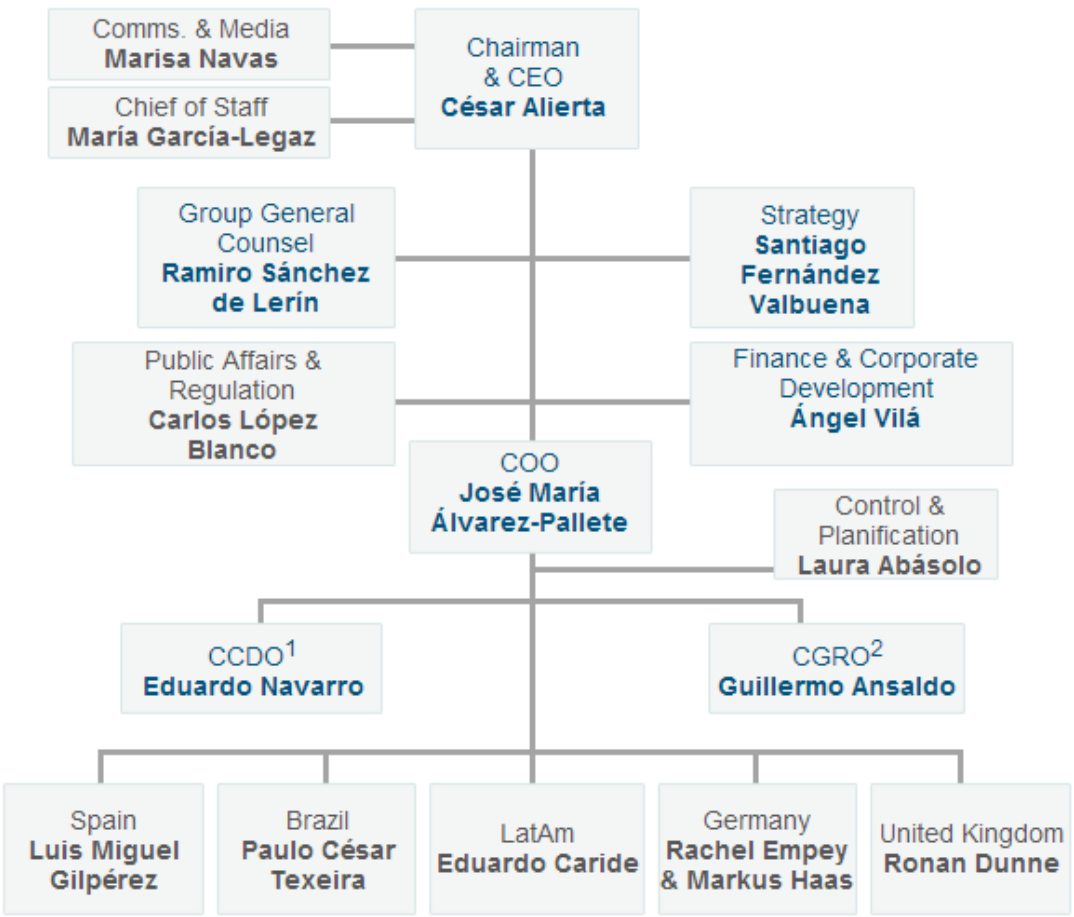


FIGURE 2 - ORGANISATION CHART

It is important to say that this organization chart represents only the first view of the company organization, and that in each country there are even more management levels. This pyramidal structure, which can be observed in Telefónica organization, fits exactly with the organization model presented in management text books. The following picture is a combination between the departmentalization theory - which consists in splitting the tasks into different departments in order to increase the productivity by doing specific tasks in each department- , and the tall structure model – which divides into different management levels the structure organization of a company-.

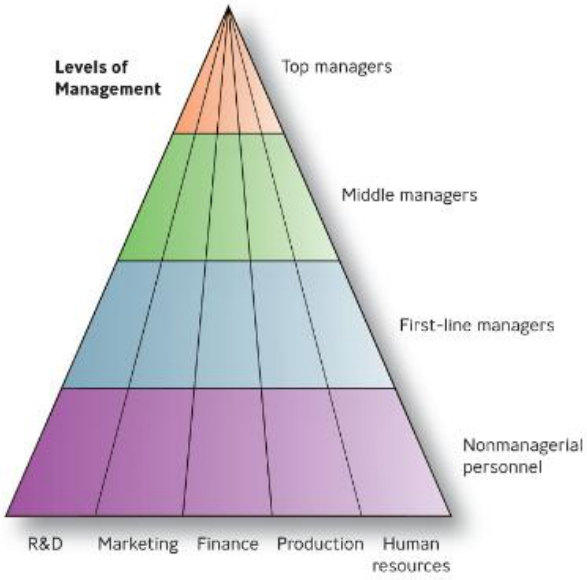


FIGURE 3 –PYRAMIDAL STRUCTURE

This organizational structure has an important impact within the organizational culture. We can define the culture of a company as a system of values, beliefs and symbols broadly shared among the members of an organization [7].

Many researches have been done about the topic of company culture. Nevertheless the theory proposed by Charles Handy (1991) is one of the most accepted by the research community. Charles Handy, in his book "Gods of Management" [8] proposes that the culture of any company could be classified into 4 categories (what he names cultural archetypes): the power culture, the role culture, the task culture, and the person or support culture.

After having studied the different cultural archetypes and after having finished my experience in Telefónica, I believe that the company fits in the "Role Culture". According to the role culture definition, Telefónica works using a system of rules, procedures and structures created to guarantee its efficiency. At the same time, this cultural archetype is associated to the bureaucracy model.

TELEFÓNICA GLOBAL SOLUTIONS

As it has been previously presented, Telefónica is a huge company. For this reason there are different business units in charge of certain parts of the business. In my case, my internship was done in a business unit called "Telefónica Global Solutions". This unit is dedicated to provide international solutions to multinational companies.

Telefónica Global Solutions (TGS) has presence in different countries all over the world. Generally, TGS is organized in local offices in the countries that they operate. In the case of France, the TGS local office is based in Paris – La Défense. It is important to note that Telefónica is an off-net telecom service provider in France. It means that Telefónica does not have its own network to deliver telecommunication services.

The Paris local office is situated in "La Defense", on the 11th stage of the "Atlantique Tower". The office is designed as an open space, which means that there are no private desks. All the employees and managers share the same space. Nevertheless, there are two meetings rooms specially designed for the video and call conferences, group discussions and meetings with customers.

In Paris local office there are two different teams working together. On the one side there is the sales team, reporting to the local manager Laurent Saint-Martin. On the other side there is the operational and customer service team that responds for the operations to the Head of Office Nicolas Pasquet (who was one of my supervisors) and to Humberto Casado, for the Customer Service issues. The next image is an extract from the Paris Local Office operations Organization chart.

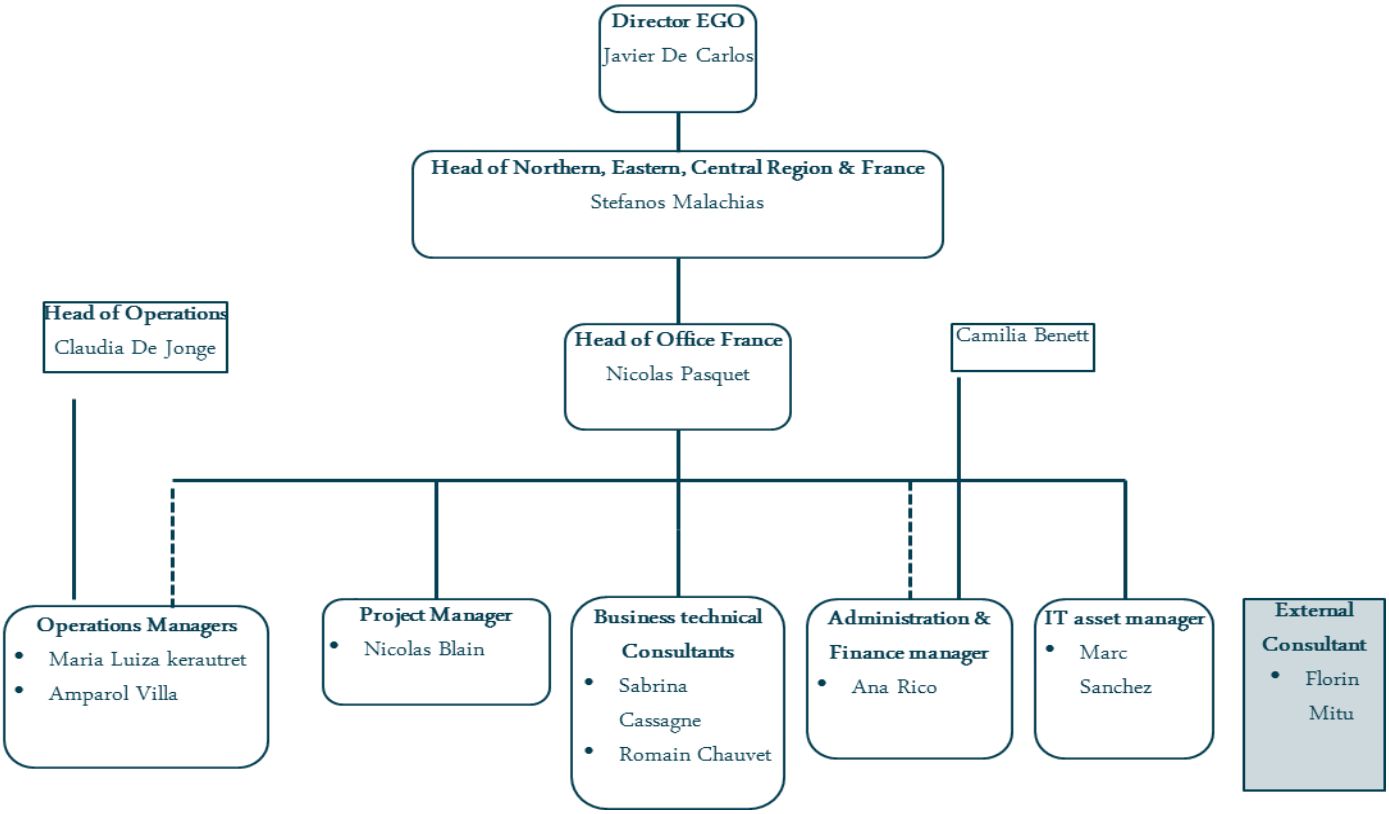


FIGURE 4 - PARIS OFFICE ORGANISATION CHART

3. THE CUSTOMER: DHL

Despite Telefónica Global Solutions France has plenty of customers; one of the most important is DHL. In addition, during my internship, I dedicated approximately 90% of my time working in projects related to DHL.

DHL is one of the largest logistic companies all over the world. The company is part of the world's leading postal and logistic group: Deutsche Post DHL and it is present in more than 220 countries. DHL, with a number of employees exceeding 285.000 is focused in providing to their customers any logistic solution needed.

Following the same logic that I used when introducing Telefónica, and with the aim to introduce DHL to the reader, the mission and vision of the company will be introduced within the next paragraphs. From the DHL website, we can find that the company's mission rises in 4 statements [9]:

- Simplify the lives of our customers
- Make customers, employees and investors more successful
- Make a positive contribution to the world
- Always demonstrate respect when achieving our results

On the other hand, the vision of the company emphasizes that "DHL wants to be the Logistics Company for the World" [9].

When analyzing the logistic sector, we can easily identify that the telecommunication services constitute a really important part of their business model. Nowadays the logistic sector is based in enormous IT structures. From the customer who wants to send a package to the employee who wants to deliver it, the Information Technologies are involved. It means that DHL needs a high quality telecommunication services 24h per day all over the world.

As we can understand from the mission and vision of the company, DHL always demands the best from their providers. So, in Telefónica Global Solutions Paris a whole team is working day after day in order to provide the best IT service to DHL.

Once the customer has been introduced, another important point of this chapter is to explain how DHL is internally organized. As it has been explained, DHL is a huge company that offers a group of different logistic solutions: from sending a package between Paris and Brest to sending heavy machinery by plane to another country. For this reason, DHL is organized in business units, each one of them dedicated to a specific end. This organization impacts directly to my projects development because all the analysis, presentations, uploads, etc… have to be done business unit per business unit. In a way, we could say that we work with each business unit like if they were different customers (having sometimes different needs, different managers, etc…).

Basically, DHL is organized in 7 different business units. Each one of them will be named and explained below:

Express: this business unit is in charge of transportation of urgent documents and goods door to door in more than 220 countries all over the world. This business unit is one of

which has more sites in France, so Telefónica's teams are always paying a special attention to it to ensure that no problems affect them.

Global Forwarding: this business unit, also called DGF, takes care of a great variety of customer's needs. This business unit operates with multi-modal transport solutions, from trucks to ships. During my internship I worked close to this business unit because I was in charge of a specific project that affected just this business unit.

Freight: taking care of the customer needs, this business unit works close to DGF to deliver logistic solutions to the clients. After express, Freight is the second biggest business unit for DHL France, so due to the high number of sites, it was especially important to double check all the analysis in order not to forget any single site.

Supply Chain: also known as DSC, this business unit provides warehousing, managed transport value-added services and offers specific logistic solutions to the customer. This is also a business unit with lots of sites on the French territory.

Global Mail – Parcel: This business unit is one of the market leaders in mail solutions and business to consumer (B2C) solutions. This business unit is able to provide mail services all over the world. In the case of DHL-France, nowadays this business unit is really small (just 3 sites), for this reason, my contact with this business unit during my internship has not been very intensive.

Aviation: this business unit is in charge of the air transport. Despite the numbers of sites of this business unit is small, it is extremely important to provide a high quality IT service to this business unit to avoid sending planes without the right packages inside.

GBS: this business unit is an internal unit for DHL and it is in charge of the company IT services. This business unit operates in a transversal mode, which means that with Telefónica, GBS has to ensure the IT services for the rest of business units.

4. MAIN WORKING AXES

Once both: the company and the customer have been introduced; I can start with the main working axes presentation. The main objective of this chapter is to provide a general viewpoint of the context and the kind of tasks that I developed during my internship.

As set up in the introduction of this document, my internship in Telefónica consisted in working in two main axes: a first one known as "Revenue Assurance", and a second one which will be called: "Discovery of telecom operator's roles". Both working axes have let me have the opportunity to use in a practical way the knowledge acquired during my engineering studies at the same time that I learned and got in deep into new concepts.

This part of my report will be focused on presenting the two main axes and missions that I have been doing during my internship. Nevertheless, the aim of this chapter is not to go in deep on the different missions that I have done, it will be done in great detail in the chapter 6 called "Projects Done". Within the chapter 6, I will explain in detail each mission that I have done focusing on three main aspects: (1) Presentation of the problem, (2) Presentation of the proposed solution and technical implementation: the steps to be followed, the risks, time management, etc…, and (3) Main difficulties and conclusion.

The main reason to start by introducing the working axes in a different chapter before explaining in detail the missions and projects done is that during my internship I have been doing many different missions that despite they are interrelated between them it is necessary to have a global vision viewpoint to see its interconnection.

I think this organization could provide the reader a clearest vision of my internship avoiding the trap to focus too much in details before having a general picture of the situation.

4.1.REVENUE ASSURANCE

During my internship, the major tasks that I developed were related to Revenue Assurance activities. For this reason, within this section the Revenue Assurance is described.

Revenue Assurance is a kind of business activity that basically consists in using data quality and improvement processes to increase the revenues and margins without seeking to generate additional sells. It means that revenue assurance provides to the companies additional revenue by reducing the operational inefficiencies that are common in many business sectors. Particularly the assurance revenue activities are extremely useful for telecommunication providers companies like Telefónica, as it will be explained below. In many cases, telecom operators have a dedicated revenue assurance department.

The success of revenue assurance activities rises in the income produced when underperformances are detected and corrected. The value added by revenue assurance departments also includes the recovery of the lost revenues through emitting additional invoices, renegotiating with suppliers, billing uncollected payments, etc… The

responsibilities of this department are in essence to detect, correct and prevent any possible lack of revenue in order to maximize the company's profit.

Before getting in deep of what causes the problem of this lack of revenues in telecom service providers, it could be interesting to introduce the results of a survey managed by the TM Forum. This organization specialized in analyzing communication business has conducted a benchmark survey in 2008 that shows an average leakage of 1% of the gross revenues. If we consider that the gross revenues of telecom service provider are about thousands of millions per year, we realize that a loss of a 1% is enormous.

Next, I will explain what causes the problem that produces the revenue leakage. First of all, it is important to understand that the revenue chain of a telecom company is extremely complex because of the different services and technologies provided to the customer. As it is probably well known by the reader, the demand of telecom services increased dramatically during the last decades: from the fixed voice services to the mobile and machine to machine solutions, year by year the connections between devices increase. The fact is that the more devices are in a network, more are the chances of failure in each of its connections. The revenue leakages are produced when a telecom company is not able to correctly invoice for a given service.

In order to get more in detail about the cause of the problem, the voice billing cycle of a telecom service provider company is explained below:

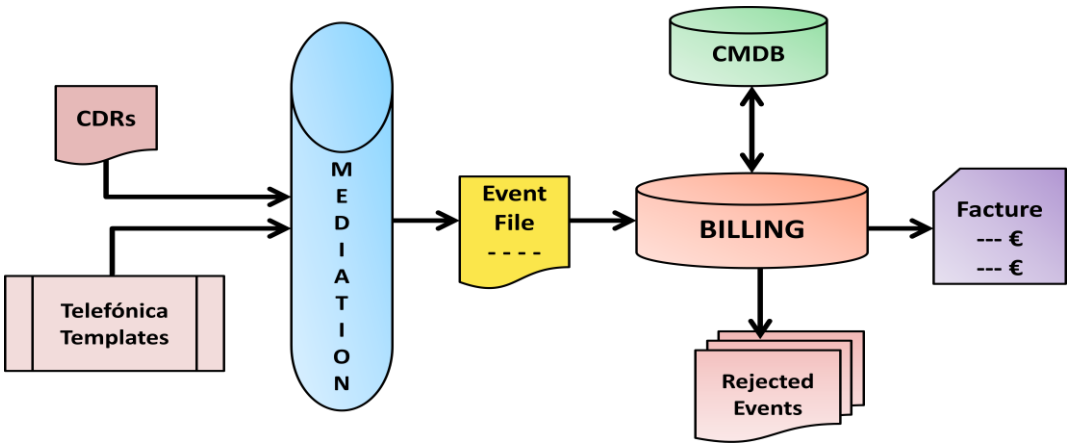


FIGURE 5 –VOICE BILLING CYCLE

To produce a voice telecom invoice, the first step is to recover the CDRs (Call Detail Record). A CDR is created for each communication between two devices and contains all the information about the communication. Some of the main attributes that can appear in a CDR are: the phone number of the calling and the called party, the call duration, the starting and ending time of the call, the billing number charged for the call, the route by which the call entered and left the exchange, etc…

On the other hand, Telefónica has created its own templates in order to be able to analyze the information contained in the CDRs. In the mediation center, the CDRs are used to fill up the Telefónica templates and the result is an output file called "Event File".

The event file contains all the information needed for the billing teams to produce an invoice. Nevertheless, the event file uses to contain thousands of phone numbers, which need to be identified and associated to an end user. The billing center is in charge of recovering the information from the event file and matching this data with the CMDB. The CMDB contains all the information about any single service provided to the customer. So, by matching each row of the event file with the CMDB it is possible to associate to each row of the event file an end user. It means that thanks to the billing teams work, it is possible to identify who is the customer behind each event and to know exactly their name, surname, address, etc… In addition, the billing teams are able to associate to each service type the price defined in the service catalogue. Once each event is associated to an end used, it is possible to create an invoice and send it to the customer.

Nevertheless, it is important to be aware that the telecom operators manage millions of telephone numbers that produce multiple CDRs per day. It means that the dimension of the data to be treated is enormous. In addition, a single mistake in the CMDB, like a formatting mistake of a phone number could produce an error.

As the reader can understand, it is quite easy that some numbers from the CDRs do not match with the CMDB numbers. Each time that a mismatch occurs, a rejected event is produced.

The rejected events are the results of mistakes within the billing cycle. Each time that a rejected event is produced, it means that a communication has not been invoiced. For these reason, one of the main objectives of the revenue assurance is to reduce the number of rejected events.

Once the problem and the billing cycle are understood, the next step is to detect where the problem is. Despite there could be infinite errors sources, the maximum leakage of revenue is located in the CDRs and Event files. We can distinguish two main areas where problems could come from: (1) Network and (2) Rating and Billing Systems (basically CMDB).

Within the network problems we can identify the following: signaling problems, CDRs not sent to mediation, mistakes in the CDRs, CDRs lost in mediation, duplicated CDRs, etc…

On the other hand, problems with Rating and Billing are mainly related to the CMDB. As previously explained, mistakes in the CMDB will not allow an event to be matched with an end user and the event will not be invoiced, which would produce a leak of revenue.

Before concluding the Revenue Assurance explanation, it is important to define the three main types of processes that can be used when developing revenue assurance projects [10]:

Detective processes: These kinds of processes are useful to identify the revenue leaks. The detection activities can be done by monitoring the network, investigating and auditing. Within the detective processes we can as well identify all the tasks related with the data analysis. A part of my internship was dedicated to the analysis of the row data in order to try to find gaps between what it should be invoiced to the customer and what was really being invoiced. This gap constitutes the leaks of revenue that the next kind of project will try to fix.

Corrective processes: These processes are used to repair the problems identified in the detective processes. During my internship I was also focused on working on corrective processes. Within this group we can identify the update of the CMDB and other databases, the labeling of switches, etc…

Preventive processes: Once the problem has been detected and corrected, the last but not least is to ensure that the problem is not going to be repeated. Despite during my internship I was not in charge of preventive processes, they are as well an important part of the revenue assurance activities. These processes can be done by sending artificial CDR to the network, by updating periodically the databases, etc…

4.2.DISCOVERING TELECOM OPERATOR ROLES

The second working axe of my internship has a double objective: on the one hand, I was challenged to learn and understand the main roles of a telecom operator by discovering the different departments and their daily tasks. On the other hand, the missions included in this axe required me to use knowledge and skills from many different disciplines, like informatics to develop some applications in the programming language VBA, economics to understand and be able to create financial reports with added value information, and network and telecom concepts to be able to understand what we were analyzing …

In a first approach to this working axe, I should say that the group of missions contained in this axe has allowed me to realize how the revenue assurance is really close to almost all the departments in a telecom operator company. By discovering the different actors and their roles in the company I began to understand the huge impact that the revenue assurance could make to the whole company. In order to help myself getting the biggest possible amount of information without getting lost, I decided that using the revenue assurance as a *"path"* to discover de different departments in a company could be (and in fact it has been) a good approach to succeed in my task.

Following the logic explained, in this chapter I am just going to explain the context of this working axe, without focusing on the missions done (which will be shown in the chapter 6).

Within the scope of this working axe, many different missions related with different departments were proposed to me (creation of a financial report for our customer, helping in the quotation process, creation of a tool to optimize the calculus process to install routers in a new network…). Despite these missions were really exciting to me, I realized that a better understanding of the departments for which I was working for would be a good idea. For this reason, I scheduled a meeting with a member of each department to go in deep on their daily tasks and to learn the role of each department. On the one hand, this strategy allowed me to understand better the little missions I was designed to do, and on the other hand, these meetings let me the opportunity to learn a lot of how the telecom operator business works.

5. TOOLS

First, I would like to say that my mentors have provided me all the tools and instruments that I needed during my internship. On the one hand, they provided me all the software and applications necessaries to succeed in my different missions. On the other hand, they also provided me some instruments which allowed me to work even more comfortable. Just as an example, since the first day I received a personal computer, a hotspot and a mobile phone in order to be able to work in the best conditions.

Despite the different tools that were under my disposal, in this chapter I would like to focus on the main tools that I used when working in my missions. So, I am not going to explain the tools that I have used just for sporadic or short missions but I am going to go in deep of the most used during this 6 month: CMDB, Service Catalogue Excel-VBA, Portail Client-Telefónica and SaaSWeDo Software. The objective of this chapter is to explain the tools used to achieve the goals of my internship.

5.1.EXCEL – VBA

VBA (Visual Basic for Applications) is the programming language that I used during my internship in order to create automatic information treatment procedures to analyze and work with the different databases. These procedures were saved as “macros”, which are sets of instructions that allow Excel to do some specific tasks predefined by the programmer. The macros I have created allowed me to do plenty of things such as saving time by automatizing long and repetitive procedures or creating applications to do a specific task, among others.

Learning VBA has been one of the first challenges that I had to deal with. I must say that at the beginning of my internship I had no idea about this language, but extrapolating my knowledge in other programming languages learned in the school and reading some manuals and tutorials about VBA, I figured out how to start developing the macros to complete the different tasks proposed by my mentors. Nowadays, after using this language in my daily tasks, I feel very comfortable with it, and despite my passion is not programming, I strongly believe that the fact of having learnt this language could be a very powerful tool for me in the near future.

In my view, there are plenty of tasks where Excel is involved in the daily missions that the employees have that could be optimized by using macros. By knowing this programming language I will be surer to not getting into the traps of wasting my time by manually repeating long and non-value added procedures in Excel.

5.2. SERVICE CATALOGUE

The service catalogue is a tool were the commercial information related to the relationship between Telefónica and the customer is written down. Despite there are other sources of information about the relationship between both parts (such as the formal contract), the service catalogue contains all the information that I needed to know in order to complete

my missions. This tool was extremely useful for me because it contained both: the price and the technical details of each service or device that Telefónica provides to the customer.

Next, I'm going to explain the different groups of services that Telefónica is providing to the customer without going in deep into price and technical details. In my view, just a quick mention of the most important services offered by Telefónica will be enough to contextualize my working environment, and will allow the reader to better understand when in chapter six I will go in deep into each mission.

The service towers (services provided by Telefónica to the customer) are: (1) Fixed Voice, (2) Mobile Voice, (3) Fixed Data, and (4) Consultancy Services.

- **Fixed Voice**: the aim of fixed voice services is to provide fixed communication voice and the required devices to the customer sites. Within the fixed voice service tower we can distinguish:
    - Devices: Regular Phone, Advanced Phone, Receptionist Phone and Cordless Phone
    - Accesses: BRI/PRI, analog lines and analog extension
    - Services: Voice mail, music box…
- **Mobile Voice**: this service tower is dedicated to provide mobile communications to the customer employees.
    - Devices: mobiles phones (different phones categories can be chosen).
    - Mobile Data: UMTS Data Card
    - Services: basic and advanced mobile phone services such as SMS, MMS, Roaming, Dual SIM card, Voice Mail…
- **Data:** data services must provide internet connection to all the customer sites. Among the data services provided we find:
    - LAN: Telefónica provide LAN service to the customer.
    - WAN: this offer is composed by two parts: (1) Connection, and (2) Bandwidth. The combination of both parties will make differences in the price and the service quality.
- **Consulting services**: when required by the customer, Telefónica offers consulting IT services as well. The main consulting services offered are:
    - Technical consultant
    - Project Manager
    - IT architect

5.3.CMDB

The first step to succeed in my missions during my internship is to understand the concept of CMDB. CMDB is the acronym of Configuration Management Database. The CMDB is used as a central database to match all the components of an Information System. Like it has been shown in our IT courses in Telecom Bretagne, this is a particular and powerful database which contains capital information about the main elements of an Information System. It uses to contain information about the employees, the devices, the services provided, etc… One of the most relevant aspects of the CMDB is that the relationship

between these elements is represented. As a result, we can easily identify, for example which telephone and services are associated to an end user or how many LAN ports are deployed in a specific customer office. In other words, we can say that the CMDB contains all the information related to the inventory that Telefónica has deployed in our customer sites.

Until we do not realize about the importance of the information contained in the CMDB, we cannot be aware of the risks that we are assuming if this database is not correctly updated, if there are mistakes, etc… To sum up, we can affirm that having an uploaded and clean CMDB is essential for the commercial relationship between Telefónica and their customers.

Another important fact that is important to mention is that Telefónica uses the CMDB to invoice the customer. So every single change of the customer inventory has to be immediately updated to the CMDB, and as I will explain later, many times the changes have not been uploaded producing many complains from the customer when receiving the invoices.

The procedure to update and modify the CMDB is centralized in Prague. Two types of Microsoft Excel files are under disposal of our customers to register every change (creation of a new device, modification, or suppression). These files are called "Data Collect"-used when creating new devices or services- and "Data Foundation" – used when modifying the current inventory-. During my missions, I have been using these two files a lot, because as I will explain later, an important part of my internship consisted in the cleanup and update of this database.

As the CMDB is a complex database, Telefónica provides to their employees the CSUID, which is a Microsoft Excel file that represents a "picture" of this database. Using the CSUID allows us to manage and work with the CMDB in an easy way by using Microsoft Excel. Otherwise, it would be extremely complicated to analyze and work with all this huge amount of information. Twice per week the CSUID is published by the SMC Prague. Despite the existing difference between the concepts CMDB (real database) and CSUID (Excel representation of the CMDB) we are going to use from now just the term "CMDB" to refer to this database.

The CMDB is formed by 11 different sheets where we can find information about the different service towers: (1) Fixed Voice, (2) Mobile Voice, and (3) Fixed Data. Within the main information we can distinguish between: (a) Site Information: site code, address, business unit…, (b) Device Information: device type, device model, optional active services…, and (c) End User: name, surname, telephone number, cost center…

Just to give an approximate idea about the view of the CMDB, a picture corresponding to the fixed voice sheet could be found in next page. Within this picture it is possible to see the general appearance of the Excel file with which I spent hours working with during my internship. Please note that for confidentially reason the data will remain unreadable.

Creation Date	02.07.2014
Week	27
Country	France
Business Unit	all

CSUID Report
Fixed Voice

Customer CSID ID	Country	Legal Entity	Business Unit	Site ID	Site Name	Site Display Name	Address	City	State / Prov	Country	Postal Code	Service ID	Service Description	Ex
FVT000005478	France	DHL International Express (France) SAS	Express	ETO-FRA-SITE0267	STE000000000284	95357RCDG_WP_XX_PM2'C'	Z.I. Paris Nord 2 244, rue de la Belle Etoile B.P. 58252 'C'	ROISSY CDG CEDEX	N/A	France	95357	CFVT00012	Fixed Voice Traffic Charges	
FVT000005479	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0257	STE000000000257	68000CLMR_ZP	Zone Industrielle Nord 25, rue Denis Papin B.P. 59591	COLMAR CEDEX	N/A	France	68015	CFVT00012	Fixed Voice Traffic Charges	
FVT000005481	France	DHL Holding (France) SAS	GBS	ETO-FRA-SITE0575	STE000000000415	63500CACD_ZP	Parvis Cédre Rue Edison	Drac	N/A	France	63500	CFVT00012	Fixed Voice Traffic Charges	
FVT000005482	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0379	STE000000000472	5987LSGL_ZP'C'	2 Rue de Gossard 'C'	LESQUIN	N/A	France	59810	CFVT00012	Fixed Voice Traffic Charges	
FVT000005483	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005486	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0288	STE000000000185	42484LFLS_IMP_FMA	DHL sites Fail Hôtel de Tolage	LA FOUILLOUSE	N/A	France	42484	CFVT00012	Fixed Voice Traffic Charges	
FVT000005489	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0379	STE000000000472	5987LSGL_ZP'C'	2 Rue de Gossard 'C'	LESQUIN	N/A	France	59810	CFVT00012	Fixed Voice Traffic Charges	
FVT000005490	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005498	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0379	STE000000000472	5987LSGL_ZP'C'	2 Rue de Gossard 'C'	LESQUIN	N/A	France	59810	CFVT00012	Fixed Voice Traffic Charges	
FVT000005499	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005503	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005504	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0228	STE000000000288	66000PPGN_ZP	14 avenue de Rome	PERPIGNAN	N/A	France	66000	CFVT00012	Fixed Voice Traffic Charges	
FVT000005505	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0379	STE000000000472	5987LSGL_ZP'C'	2 Rue de Gossard 'C'	LESQUIN	N/A	France	59810	CFVT00012	Fixed Voice Traffic Charges	
FVT000005506	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005508	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005510	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0379	STE000000000472	5987LSGL_ZP'C'	2 Rue de Gossard 'C'	LESQUIN	N/A	France	59810	CFVT00012	Fixed Voice Traffic Charges	
FVT000005512	France	DHL International Express (France) SAS	Express	ETO-FRA-SITE0245	STE000000000248	57100SNTS_WP	38, Chemin de la Métairie	SAINTES	N/A	France	57100	CFVT00012	Fixed Voice Traffic Charges	
FVT000005515	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0257	STE000000000257	68000CLMR_ZP	Zone Industrielle Nord 25, rue Denis Papin B.P. 59591	COLMAR CEDEX	N/A	France	68015	CFVT00012	Fixed Voice Traffic Charges	
FVT000005514	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005516	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005516	France	DHL International Express (France) SAS	Express	ETO-FRA-SITE0267	STE000000000284	95357RCDG_WP_XX_PM2'C'	Z.I. Paris Nord 2 244, rue de la Belle Etoile B.P. 58252 'C'	ROISSY CDG CEDEX	N/A	France	95357	CFVT00012	Fixed Voice Traffic Charges	
FVT000005517	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0379	STE000000000472	5987LSGL_ZP'C'	2 Rue de Gossard 'C'	LESQUIN	N/A	France	59810	CFVT00012	Fixed Voice Traffic Charges	
FVT000005518	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005519	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0379	STE000000000472	5987LSGL_ZP'C'	2 Rue de Gossard 'C'	LESQUIN	N/A	France	59810	CFVT00012	Fixed Voice Traffic Charges	
FVT000005520	France	DHL International Express (France) SAS	Express	ETO-FRA-SITE0267	STE000000000284	95357RCDG_WP_XX_PM2'C'	Z.I. Paris Nord 2 244, rue de la Belle Etoile B.P. 58252 'C'	ROISSY CDG CEDEX	N/A	France	95357	CFVT00012	Fixed Voice Traffic Charges	
FVT000005521	France	DGF Global Forwarding (France) SAS	DGF	ETO-FRA-SITE0804	STE000000000874	76700HRGVL_ZO	Parc Logistique de Poste Normandie	Le Havre	N/A	France	76805	CFVT00012	Fixed Voice Traffic Charges	Ha
FVT000005522	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005523	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0379	STE000000000472	5987LSGL_ZP'C'	2 Rue de Gossard 'C'	LESQUIN	N/A	France	59810	CFVT00012	Fixed Voice Traffic Charges	
FVT000005524	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005526	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0379	STE000000000472	5987LSGL_ZP'C'	2 Rue de Gossard 'C'	LESQUIN	N/A	France	59810	CFVT00012	Fixed Voice Traffic Charges	
FVT000005527	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0418	STE000000000513	84300CAVA_ZP'C'	Marché d'Intérêt National BP. MIN 18- Halle 4 'C'	CAVAILLON CEDEX	N/A	France	84353	CFVT00012	Fixed Voice Traffic Charges	
FVT000005529	France	DHL Freight France SAS	Freight	ETO-FRA-SITE0379	STE000000000472	5987LSGL_ZP'C'	2 Rue de Gossard 'C'	LESQUIN	N/A	France	59810	CFVT00012	Fixed Voice Traffic Charges	
FVT000005530	France	DHL International Express (France) SAS	Express	ETO-FRA-SITE0267	STE000000000284	95357RCDG_WP_XX_PM2'C'	Z.I. Paris Nord 2 244, rue de la Belle Etoile B.P. 58252 'C'	ROISSY CDG CEDEX	N/A	France	95357	CFVT00012	Fixed Voice Traffic Charges	
FVT000005535	France	DHL International Express (France) SAS	Express	ETO-FRA-SITE0267	STE000000000284	95357RCDG_WP_XX_PM2'C'	Z.I. Paris Nord 2 244, rue de la Belle Etoile B.P. 58252 'C'	ROISSY CDG CEDEX	N/A	France	95357	CFVT00012	Fixed Voice Traffic Charges	

FIGURE 6 - CMDB

5.4. Intranet Portals And Service Catalogue

This section is dedicated to explain the internet portals more relevant for my mission development. First, the “Customer-Telefónica” portal is explained. Then, I will focus on the explanation of the SMC portal. Finally, SFR-Eligibility portal will be shown.

The **customer-Telefónica portal** is a key tool for the development of the commercial and operational relationships between Telefónica and the customer.

The portal allows the customer to create new commands for new devices or services, to modify the current services, to check specific information about the inventory, etc… Despite in my daily tasks I didn’t have to use it, this portal constitutes an important part of the relationship between the costumer and Telefónica, so I considered interesting to mention it in my report.

The **SMC portal** is capital for Telefónica. Through this portal Telefónica has access to the CMDB, the billing center and a reports library, among others. During my internship I used this tool very often. On the one hand, I used to access to the portal twice per week just for downloading the latest CMDB version in order to check the status of the modifications, terminations and creations that were put in place. On the other hand, I acceded to the portal to download different invoice reports. The possibility to obtain customized invoice reports was extremely helpful for my during the task of creation a cost report, as I will detail in chapter 6.

In my view, this tool is really helpful because it centralizes the main information about the operations and the assets management processes.

The **provider portals** are used in many tasks and by different departments in the office. These portals are the most common way of interaction between the telecom providers and the customers. It is important to note that in France Telefónica is an Off-Net Operator. It means that Telefónica does not have its own telecommunication network, so in essence Telefónica must buy the traffic and lease the lines to On-Net Operators like SFR or OBS in order to resell this traffic to their end customers. In my internship I used the SFR portal many times to succeed in the quotation mission. More concretely, I used the eligibility tool available in SFR portal. This tool (called India) allowed me to check the eligibility in order to provide the prices to build the commercial offer. The quotation process will be explained in chapter "Projects Done"

5.5.SAASWEDO SOFTWARE

SaaSWeDO is a software company specialized in "Software as a Service" solutions in Telecom Expenses Management (TEM). The Telecom Expenses Management is a business part of the telecom service providers and includes a group of activities like invoice analysis and verification, float management, commands management, etc… SaaSWeDO is a leader company in software publishing for the management of telecoms, offering innovative and efficient solutions 100% SaaS [11].

Telefónica Global Solutions France has decided to externalize their TEM services and the chosen provider was SaaSWeDO. This French company has developed a software called MyTem360 that fits with the Telefónica's needs.

MyTem 360 is a 100% SaaS (Software as a Service) solution chosen by some companies of the CAC40 and used by more than 4500 companies around the world. This application is compatible with all formats billing data operators and distributed by telecom professionals.

As it will be explained in chapter 6, during my internship I used MyTem360 software during one of my projects. Despite the application is quite user-friendly, I received training from SaaSWeDo to learn how to use the application as an advanced user.

Basically, the application is used with two main objectives: (1) Command management; and (2) Invoice and Cost Analysis. The first one means that Telefónica uses this application in order to send the commands of new lines, devices, etc… to the SMC Prague. The Invoice and Cost Analysis consists in trying to find potential savings by analyzing the reports produced by the application.

MyTem360 is organized in 4 different modules. The first module is the welcome page where the KPIs and resume figures are displayed. The welcome module allows the user to customize the graphs and KPI by choosing the time period of the analysis, the points to analyze, etc. The following image shows an overview of the welcome page.

FIGURE 7 - SAASWEDO

The second module is dedicated to create full customizable rapports. Within this module the user can decide which information should appear in the reports. Furthermore, the application allows the reports to be periodically and automatically sent to the authorized users.

The third module shows the entire row data related with the invoices. Using this module the authorized user is absolutely free to analyze the invoice details. The application allows doing advanced searches by phone number, end user, address, etc.

Finally, the fourth module is divided in two sections: “Float Management” and “Commands Management”. The “float management” allows Telefónica to have under control all the devices in their telecom park. However, the “commands management” is used to command services to the providers.

6. PROJECTS DONE

This chapter is dedicated to explain in detail the different projects where I have been involved during my internship. The projects are divided in two categories depending on the type of project: the projects related to Revenue Assurance topics will be detailed in section 6.1, and the projects related to General Telecom Operation topics will be detailed in section 6.2.

It is important to note that an exhaustive explanation of the projects will be done, especially for those which are considered major projects classified in the section 6.1. For these projects, the analysis will be done in three points: first of all the context of the project will be described, a second point will be dedicated to explain the implemented solution and the technical steps to achieve the solution. Finally, within the third point, the main problems and conclusions of the project will be shown.

The projects classified in the section 6.2 will be as well extremely detailed but without splitting the explanation into 3 points. These projects are considerate minor projects because I spent less time working on them and the objectives could be considered as less ambitious than the others presented in section 6.1.

6.1. AXE 1: REVENUE ASSURANCE:

6.1.1. FIXED VOICE CMDB UPDATE PROJECT

6.1.1.1. CONTEXT

Probably the "Fixed Voice CMDB Update Project" is the main project that I have done during my internship. In my view, this project was extremely useful to synthesize plenty of concepts, theory and working procedures learnt during my student years as an engineer student. As I will detail within the following paragraphs, by doing this project I applied different knowledge areas such as programming, network, economics and management.

Within the scope of the Fixed Voice Transformation program[1] Telefónica has launched a site survey campaign to discover the exact number of fixed voice assets deployed on the DHL sites. The main idea of this site survey was to help with the transformation program by providing the Low Level Design for each site. Nevertheless, the site survey results have been also used for the Fixed Voice CMDB Update project.

Before going into more detail, in a first approximation we can define that the main objective of this project were: (1) To update the DHL CMDB in order to avoid billing mistakes; and (2) To have an accurate inventory of the fixed voice assets deployed in DHL facilities.

[1] The Fixed Voice Transformation Program is launched by Telefónica to migrate the current fixed voice services to the technology VoIP.

To better understand the context of this project and going in deep to technical procedure, it will be helpful to refresh the billing cycle schema presented in a previous chapter.

As it was explained in chapter "Introducing the Working Axes", the billing cycle for telecom consumption starts with the creation of a CDR (Call Detail Record) which contains the information about the main attributes of an established communication. When the CDRs are combined with the telecom operator templates, an event file is created. This event file is the input for the billing department. During the billing process, each event from the event file is tried to be matched with the CMDB items. When the event can be associated to an end user, the event will be invoiced to the correct customer. Nevertheless, if the event's phone number cannot be found in the CMDB a rejected event will be generated. Each time that a rejected event is generated, a communication is not being invoiced, so Telefónica is losing money.

The rejected events constituted an important loss of revenue for Telefónica and the Fixed Voice Upadate CMDB project has to help to reduce this losses by reducing as much as possible the number of rejected events. As it has been explained, a possible error source is that the CMDB is not updated. When a CMDB is not correctly updated, the customer can use his telecom services as much as he wants and the consumption will never be invoiced to certain end users because the number from the CDR will not match with any CMDB number. For this reason, it is fundamental for the CMDB to always be updated. As the maintenance of the DHL CMDB has not been correctly done for a large period of time, my task was to update all the information that during the last years had not been updated.

To sum up, this project consisted in updating the DHL CMDB, which is one of the most important databases for Telefónica Global Solutions France. The project consisted in working all along the update process: from the analysis of the row data to the upload of the information. Basically, we can distinguish three main points that have to be followed in order to achieve the project.

These three points are going to be described below in order to provide to the reader enough information to understand the context of the project. Nevertheless, in next section: "Proposed Solution and Implementation" I will detail each one of these phases and explain how I proceeded.

1) **Site Survey Campaign:** as previously explained, the Site Survey Campaign consisted mainly in writing down the exact number of devices deployed in each customer site. This task was performed by NextiraOne: a technical consultant firm that uses to work with Telefónica. The site survey results were sent to me at the very beginning of my internship and constituted the row data for the rest of this project. So, in fact, my mission started just after the end of the Site Survey Campaign.

2) **Data analysis:** one of the main points of the projects was to analyze the huge amount of data provided by Nextira One. The next section will explain in detail how I managed to treat the information, the results of my analysis and how it was presented to the customer.

3) **Update the CMDB:** finally the last step of the project consisted in uploading the data to the CMDB in order to invoice properly the customer. The upload procedure is going to be extremely detailed in next section.

6.1.1.2. *PROPOSED SOLUTION AND IMPLEMENTATION*

As it has been explained in the previous section, the main final objectives of the Fixed Voice CMDB Upload were two: (1) Reduce the number of rejected events; and (2) Ensure that the invoices are correct. In order to ensure the achievement of these goals the chosen method was to update the CMDB. Other methods could have been used as well to achieve these objectives, like for example analyzing the CDRs and event files trying to find mistakes and correcting them, or analyzing the rejected events to try to find the reason to be rejected. Nevertheless it was considerated that the optimal one was to update the CMDB because it was the most complete. By using this method to solve the problem two benefits were achieved: on the one hand, reducing the number of rejected events because the CMDB data would be completed and without mistakes, and on the other hand, the CMDB would reflect exactly what was deployed in the customer facilities so it would help in both: invoicing properly and managing better the telecom assets.

The proposed solution (Update the CMDB) required a combination of skills to be applied. On the one hand, it was necessary to use programming and informatics skills in order to create the Excel macros, and on the other hand, it was also necessary a good telecommunications basis because it was mandatory to understand what was being analyzed.

In order to detail the procedure and the technical development I divided the project into 4 different phases. I will explain how I proceeded for each phase and the technical implementation. Nevertheless, in order to avoid overcharging this document, the VBA codes are not going to be detailed. The following schema illustrates the 4 main phases of the project. Next, I am going to describe each one of these phases detailing the technical procedure employed.

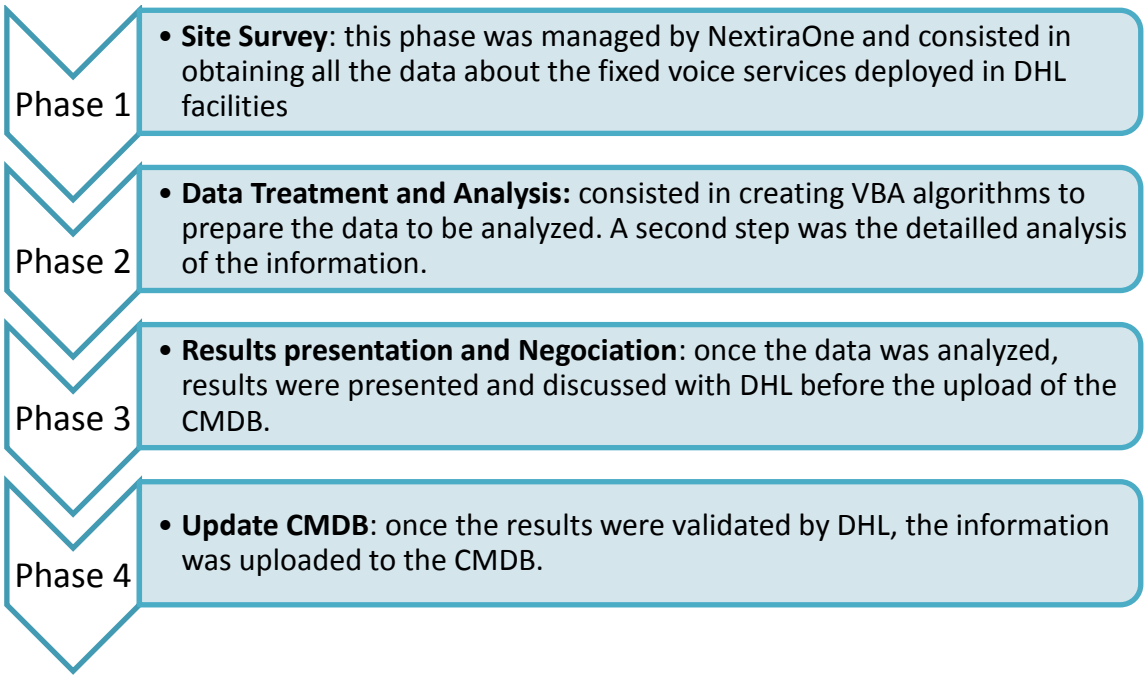


FIGURE 8 - PHASES PROJECT

PHASE 1: SITE SURVEY

Despite this phase was the only not managed by me during the project, I think it is important to explain it within this document. As briefly explained in the introduction of this project, at the very beginning a site survey was done by the technical Telefónica's provider NextiraOne.

The site survey consisted in a physical investigation about the total number of fixed voice assets deployed by Telefónica in each one of the DHL sites. For each one of the sites surveyed an output file was created. This output files were validated for the central teams in Madrid and finally were sent to me in an Excel format.

The files contained different sheets about the information of the end users (Name, surname, phone number, device type, etc…) but also about the site configuration.

PHASE 2: DATA TREATMENT AND ANALYSIS

This phase was probably one of the most important and critical of the project. The data treatment consisted in essence into compiling the information provided by all the Excel files and creating an output file to be analyzed. The output file that I was creating could be considerated as a kind of inventory. In order to create this file it was necessary to design an algorithm to select the correct data of some specific fields from the source data. The functions which implemented the algorithm were programmed using VBA language. Once the selected data was obtained from each one of the site survey files, it was necessary to translate all the data into information recognizable for the CMDB. It means that another algorithm was created to translate the device models from the site surveys into resource units that the CMDB could identify.

The next step was to add the relevant information from the CMDB to the output file. This step consisted in adding the site information to each one of the devices of the output file. It means that within the scope of this phase I matched the CMDB site information (Site Name, City, Address, Postal Code, Cost Center, etc…) with each one of the devices from the created inventory.

Once the output file (inventory) was ready I proceeded to a manual data investigation. This step consisted in checking the data integrity and trying to fix possible mistakes. This step was extremely important because when working with files produced by human beings (site survey files) there could always be some mistakes. In fact, plenty of mistakes were found (formatting mistakes, filed data swap, empty data, etc…).

Finally, once all the information was checked, the inventory was ready to be analyzed. The analysis procedure was conceptually easy. It consisted in checking device per device from the inventory if it was in the CMDB or not. This simple comparison allowed us to detect the gap between what was really deployed in DHL sites (inventory) and what was being invoiced to DHL.

Before detailing how each one of these steps was technically developed, a schema of the technical process is shown in next page:

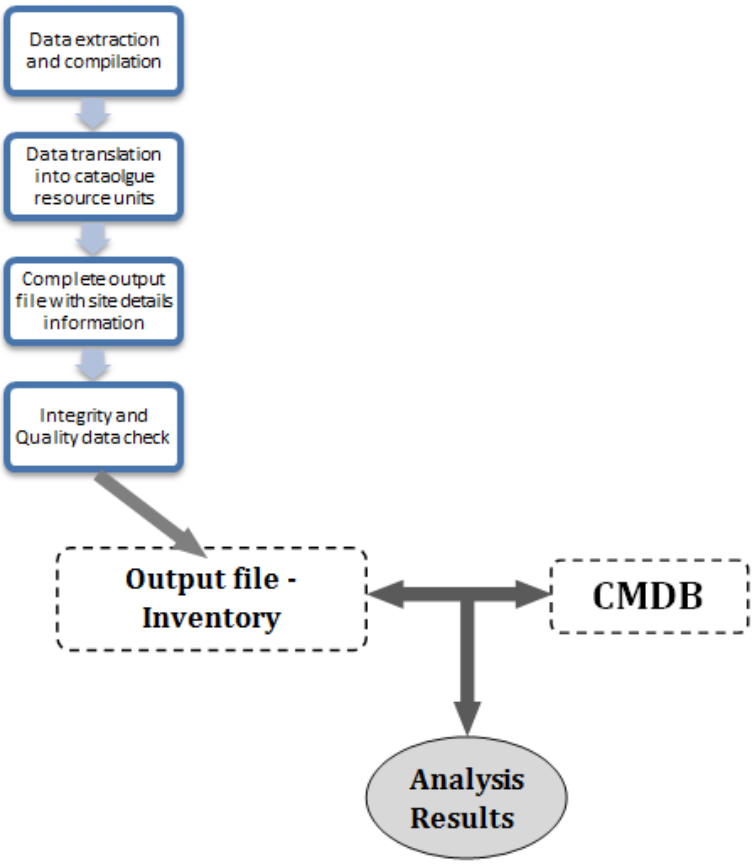


FIGURE 9 - ANALYSIS STEPS

Next, I am going to detail each one of the technical procedures followed to implement the solution to create the "Output File – Inventory".

Step 1: Data Extraction and Compilation

1) Download Site Survey files. The first point is to download the files provided by NextiraOne. These files have been put under my disposal by the Madrid central teams in the application "Telefónica-Box".

2) Save the files with the correct format name in the folder "CONCATENER". Format name has been chosen in order to allowing us to use them automatically in the VBA application. The chosen format name for these files is "a(XXX)", where XXX corresponds to the number of the file.

3) Open the file "PrincipalPlusCordless". This file is a template with macro enabled that will be used to put together all the data provided by the site survey files. The macro starts by picking the information from each one of the files. The code used to obtain the information from each file is shown in the Appendix of this document.

The code is created to allow the user select the first file to be added to the inventory (variable "K"), and the last one (variable "l"). This will permit to create the inventory step by step, selecting the files to insert.

After that, a more extensive code is created to copy and concatenate the information of each file. A code extract from the function "concatenate" is presented in the appendix.

4) Once the macro is finished, all the information will be copied in the specific sheets of the output file. Next step will consist into a manual inspection in order to confirm that the process has been done with no major mistakes, and then the sheets "Users" and "Trunks" should be copied to another template file called "Migration". This template file will be used to create the final inventory. Sheet 3 from "PrincipalPlusCordless" file will not be copied in "Migration" file but in another separated file. This particular sheet is just used to detect Cordless Coverage Acces Points (a very particular device that sometimes we find in the site survey files).

5) Download CMDB last version and copy the entire Fixed Voice data to the sheet "Datos" in the "Migration" file.

6) Once these points are done, the data is almost ready to be treated and become the final inventory. Nevertheless, there is one last point to work on. Within the "Migration" file there is a sheet called "Trunks". This sheet contains the information related to the main access of each site. It is important to verify that the main access is not already count as devices. For these reason, I created a macro to verify that there are not repeated phone numbers in the inventory. Finally, the macro will concatenate the information contained in sheet "trunks" with the rest. At this point, a very basic version of the inventory will be created.

Step 2: Data Translation

1) The next step is to translate the data into resource units defined in the DHL service catalogue. In order to be able to translate every single device to its correspondent resource unit, I started by creating a list of all the different devices existing in the inventory. Then, one by one I looked for information to classify the device into the main categories: "Regular Phone", "Conferencing Phone", "Cordless Phone", "Receptionist Phone", "Analog Phone Line" and "Analog Extension" – For faxes and alarms basically. When the list was created, I used a VBA macro to translate each device of the inventory. Once the translation macro was finished, last point was to check that no mistakes were committed and that all the devices had a resource unit translation associated.

Step 3: Complete Site Information

1) In order to complete the site information a macro has been created. This macro takes all the site information from the CMDB and tries to match with the output file that I was creating. This macro took a lot of time to be completed because it was necessary to compare row by row in both senses between the CMDB and the inventory. The most difficult part of the data treatment procedure was to copy the right information of the Cost Centers. The Cost Centers are used to identify how to invoice each device. Sometimes one site could have more than 20 different cost centers, and it was necessary that the macro takes into consideration all of them. This fact produced that the data dimension per site was variable (some sites had more cost center than others).
   Main problems: in some cases the Excel Software was not able to finish the task because the computer resources were not enough. In order to solve this problem I tried to optimize as much as I could the macro.
   Consideration for the Business Unit DGF: the business unit DGF asked Telefónica for a specific invoice method. For this reason, I worked on another project just for DGF as it will be detailed in next section.

Step 4: Data Integrity Check

1) Once the previous steps had been completed, the inventory was almost finished. Last point was just to check and correct the mistakes. As previously explained, the source data contained many mistakes that produced errors in the macro results. For these reason it was necessary to check and correct these mistakes. Within the data integrity check I proceeded in two steps:
   a. Create a macro to automatically detect the most common mistakes and correct them
   b. Once the macro had been launched, I double checked the data and manually modified if some mistake was not corrected by the macro.

Step 5: DATA ANALYSIS

Once the inventory was finished, I used it in order to find a gap between what was really deployed in DHL sites and what was being invoiced to them. I did this analysis by creating a system of pivot tables and Excel formulas. The main idea was to classify the information site per site and device per device. Once the information was separated, I compared both files: I did a comparison based on the device type and on the site identifier.

Finally, I succeeded in creating a file that resumed all the information and the gaps for all the sites. The following image provides an overview of the high number of variables analyzed.

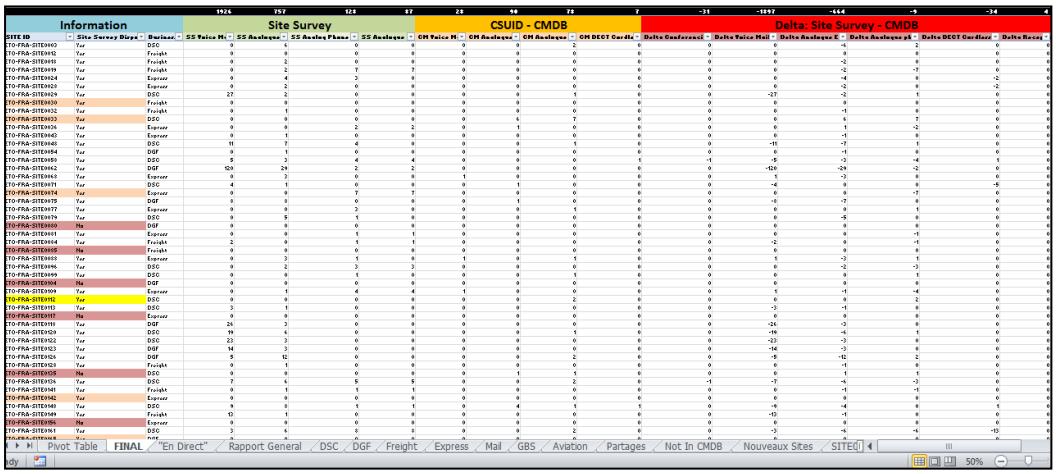


FIGURE 10 - ANALYSIS FILE

The last step of the data analysis was to create one recapitulative table for each business unit in order to present them the results of the analysis. These tables contained the difference between the CMDB and the Site Survey expressed in resource units and Euros. Finally, the total gap in Euros was shown at the bottom left of the table. The follow image is an example of the overview of these tables for the business unit "Express". For confidentiality reasons the data will remain unreadable.

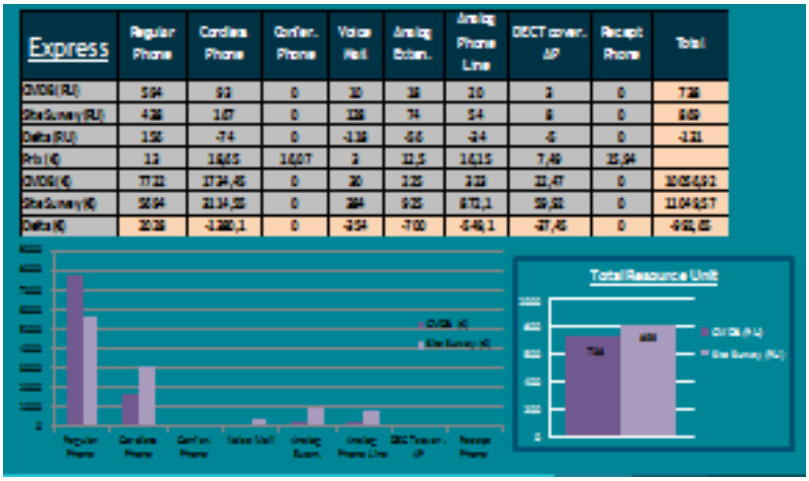


FIGURE 11 - RESULTS PRESENTATION

PHASE 3: RESULTS PRESENTATION AND NEGOTIATION WITH DHL

This phase consisted in the presentation of the analysis results to each business unit and the posterior discussion and negotiation about the results financial impact.

Once I concluded the analysis, I was focused on creating a presentation using Microsoft Power Point to inform the customer about the operational and financial impact that this project would produce. The presentation was based in 4 main points:

1) **Context of the project:** where the main objectives of the project were shared with the customer.

2) **Procedure**: within this part I explained how the information was treated and the steps followed until the obtaining of the inventory. Then, the gap analysis procedure was explained.
3) **Results**: this point was focused on explaining the gap between what was invoiced to DHL (CMDB) and what should have been invoiced (Inventory). The gaps were presented in resource units and in Euros.
4) **Next steps**: finally I shared with the customer what we were expecting from him in order to be able to update the CMDB.

When the presentation was created and validated by my supervisors, a meeting was scheduled with all the business units. During this meeting, I was in charge of presenting it to them.

Once the results were presented, a discussion started between Telefónica and DHL. These results showed a substantial gap, so it was up to my supervisor and the commercial team to negotiate with the customer how the future invoices would be affected. It is important to note that a backbilling was proposed to the customer, which means that DHL should pay for the not invoiced services.

PHASE 4: CMDB UPDATE

The CMDB upload procedure is a really important phase of this project. The main point is that, as it has been explained in chapter "Tools", the CMDB is used to create the invoices. So, once the information is uploaded to the CMDB, the next invoice will be produced with the new data. It's important to say that the upload procedure takes at least 15 days once the data has been sent to SMC Prague. It means that if any mistake is detected after the upload, there is nothing to do before the next billing cycle and the customer will receive the incorrect invoice at least once. In order to avoid mistakes, I have been using a checklist which helped me each time that a CMDB upload was required.

First, it is important to know that there are 2 types of files to update the CMDB: (1) Data Collect and (2) Foundation Data Template. The first one (Data Collect), is used when the creation of new services is required. On the contrary, the Foundation Data Template is used when a modification or a delete is required.

In our scenario, we had a complete inventory for each business unit, so the most accurate way to proceed was, in my view, to delete the previous CMDB data and recreate it with the information provided by the file created with the Site Survey results. In other words, to succeed in my task, I followed a procedure to proceed with the update of the CMDB. This procedure consisted in: (1) Deleting the old data from the CMDB, (2) Creating the new cost centers, (3) Creating new devices and FVTCH[2]. Each one of these steps ended with an output file that had to be sent to the SMC Prague[3]. When these three output files were sent to the SMC Prague, the upload of the CMDB started and the billing and IT teams from Prague proceeded to upload the CMDB. As it can be understood by the reader, the upload

[2] FVTCH is used to describe Fixed Voice Traffic Charges which are the charges invoiced to the customer for the consumption.
[3] SMC Prague is the Telefónica internal unit that is in charge to upload the CMDB. Their teams are based in Prague.

of such an important database cannot be done by any Telefónica's employee not authorized. That's why the central teams in Prague were in charge of the final Upload with the data provided by the different Local Offices.

Despite the files were checked by the billing team before executing the upload, I wanted to be sure that no mistakes were committed by me in the files I sent to Prague. For this reason, I created a methodology that I followed to prepare the files. This methodology could be used as a checklist for any Telefónica's employee that wants to update the CMDB in a near future. The main points of it are described below:

Analysis File:

The analysis file contains a lot of information related to the upload like the site survey inventory, the CMDB and the gap analysis site per site. Despite this file is not necessary to send to the SMC Prague in order to upload the CMDB, in my view it is an essential file to produce, because it allows the Asset Manager to have the upload procedure under control.

On the one hand, a copy of the CMDB is in this file and a pivot table is used to manage easily the CMDB information. On the other hand, there is a copy of the asset inventory and there is also a pivot table within the file. Finally, by comparing the two pivot tables a gap analysis is created. This gap analysis is extremely important because it allows us to be aware of the invoice changes that the upload will produce. Also, it is extremely helpful when deciding which devices had to be back-billed.

File 1: New Cost Center

This file contains the information about the new cost centers that are going to be invoiced. As explained before, the Cost Center is very important in the billing process so all Cost Centers should be created in the CMDB in order to be able to invoice the customer. To create this file it is necessary to use the Foundation Data Template.

- The first point will be to check in the current CMDB if the Cost Center of the devices that we want to upload already exists. In the case that they do not exist, we have to create them within this file.
- Once the file is completed and all the information checked, it is necessary to validate the data by using a macro which can be found in sheet "Summary".

File 2: New Devices

This file will contain the list of services that wants to be created in the CMDB. In order to create this file it is necessary to complete the Data Collect template. When filling up this file, the first point is always to check the inventory created with the Site Survey results. Basically the most important aspects to verify are:

- That the internal phones have an extension associated and that the telephone number for these phones is: 3300000XXXX. Where the "XXXX" makes reference to the extension of each internal device.
- All the rows from the DC file contain the Phone Number, the Cost Center, the Voice Mail service (activate or not), the name of the end user and the device type.
- That there are no repeated numbers in the file. It is important to pay special attention to the internal phones, because it is possible that two phones from different sites have the same extension. In these cases, the phone number format

will be as follow: 33n0000XXXX, where "n" is used to distinguish when there are several phones with the same extension

Once the main points are checked, before sending the document it is useful to create a pivot table just to be sure that the total number of each device type is aligned with the number of devices that we wanted to upload.

File 3: Termination Services

When creating this file, there are two main types of services that we can delete: (1) Devices, and (2) FVTCH. In order to create the Termination Services file it is necessary to use the Foundation Data Template.

The procedure for the devices is not complicated. As we want to recreate the entire database, we are going to delete all the existent devices except: the devices allocated in new sites (because the site survey is not done for new sites) and some special sites that for different reasons site surveys are not done. It is important to do not delete the sites where sites surveys are not done because if not, the data will be lost and the customer will not be invoiced for these services.

For the FVTCH, it is important to understand that each time that a device is created, a new FVTCH is created as well. This new FVTC will always be associated to the new device. For this reason, and in order to prevent double billing some numbers, it is important to delete all the FVTCH existent in the CMDB that are identical to the phone numbers of the new devices. So in the case of the FVTCH only the FVTCH associated to new devices will be deleted. We decided to proceed like this because if there is any mistake in the site survey results we can stop invoicing a phone number with traffic associated. On the contrary, the FVTCH not used are not invoiced, because the traffic is paid by DHL just when it is used.

Finally, when the three files plus the analysis file are created, the files can be sent to the SMC in order to upload the CMDB. It is important to understand that the task does not finish when sending the information but after once it is uploaded we verify that all the information is correctly uploaded.

As it has been explained in phase 3, a back bill had to be applied to DHL for the services not invoiced during the last month. In order to avoid wasting time until the negotiations came to an end, it was decided to update the CMDB before knowing the back billing data. Then, once the back-billing date was decided, a manual invoice would be produced by the SMC Prague in order back bill the total amount. For these reason, I kept a list of the gap of each site in order to send it to SMC Prague when the back bill date would be arranged between DHL and the commercial team.

6.1.1.3. MAIN PROBLEMS AND CONCLUSION

Within this section the main problems that I have found doing my project will be explained. After that, a conclusion will close this section with the aim to explain my personal viewpoint.

During the development of the project I was challenged by some important problems. Next I am going to explain some of the problems that I considered as major problems:

- **VBA programming language:** in my view, one of the biggest problems which I had to solve was the fact of using VBA language. This programming language was totally unknown by me when I started my internship. The problem was not the language itself, but the need to lean it as soon as possible. Nevertheless, thanks to the programming concepts that I learnt at the school I was able to start developing my own macros in a very short period of time.

- **Data dimension:** the huge amount of data that I had to work with affected the project in a double sense: on the one hand, sometimes I was forced to optimize the VBA codes because when comparing two databases with thousands of rows in each sheet sometimes a standard PC did not have enough resources to do it. On the other hand, and probably the most critical one, was the fact that there was so much information that during the first weeks I was not able to have a clear mental image of what I was analyzing.

- **Human mistakes:** as it has been explained, the source data that I had to use to develop the project was created manually by NextiraOne employees when doing the site surveys. The kind of problem that I found with the files sent by NextiraOne were: missing information, data swap, format mistakes… In order to solve this problem I created some functions to find missing relevant data, trying to reformat automatically the corrupted data, etc. Nevertheless, in many cases I was forced to check and manually correct some mistakes.

- **Customer responses**: a major problem that I identified by doing this project was that projects are developed in cooperation with different teams of people and it can produce some delays in the expected finish data. In our case, the inventory validation by the customer was needed before proceeding with the upload. In some cases, it took more than a month to have the return from the customer.

To conclude with this section, first of all I would like to emphasize that the results obtained through the analysis done had directly impacted in the budgets of both companies (Telefónica and DHL) because the gaps found were in some cases really high.

In a personal side, this project has also impacted me in different ways. On the one hand I learnt a lot about programming in VBA, managing databases and working with Excel files as advanced user; and on the other hand, the fact of being in charge of the results presentation in front of the customer was very exciting, as it allowed me to learn how to do professional presentations and helped me to feel comfortable when doing it.

6.1.2. BILLING PER EXTENSION

6.1.2.1. CONTEXT

The Billing per Extension project is a project related to the Fixed Voice CMDB upload. This project was launched just for the business unit DGF. The main objective of this project was to associate a single cost center for each device or end user. Despite it has been considerated as a different project, the concept is quite similar to the previous project. For this reason, and in order not to repeat the steps and the procedure, the explanation of the project will be less detailed than in the case of the Fixed Voice CMDB Upload project and only the differences between both projects will be explained.

As it has already been explained, the Cost Center is a specific code that is used for the customer to identify where the costs have to be imputed. Usually, a unique Cost Center is associated to each department in order to manage the costs that each department produces. For example, generally the finance department has a different Cost Center than the marketing or the operations department.

When Telefónica sends an invoice to DHL, it is easily possible to recognize the expenses produced by each department. Nevertheless, DGF wanted to go further and decided that they wanted to associate a single cost center to each end user.

So the goal of this project was to update the CMDB with the correct information in order to produce the invoices with a specific cost center per user.

6.1.2.2. PROPOSED SOLUTION AND IMPLEMENTATION

Within this project, the solution which was considered the best was once again to upload the CMDB. By following a procedure quite similar than in the previous project explained, the proposed solution consisted in associating a specific cost center to each device. Nevertheless, there are some major differences between both projects that are going to be detailed in the following paragraphs.

Despite it was technically possible to introduce a single cost center per device, two major problems were presented: (1) Create an algorithm able to find and attach a given cost center to each device; and (2) Obtain which cost center had to be associated to each device.

Step 1:

The information provided by the site survey was used in this project in order to create a specific inventory for DGF. This inventory was presented to DGF finance managers and it was proposed to them to identify which cost center should be associated to each device.

Step 2:

Once DGF came back to us with the inventory validated and the costs centers associated to each device, I proceeded to apply the macro that I had been developing in order to associate the cost center to the devices.

Step 3:

Finally, the CMDB was uploaded following the same procedure detailed in phase 4 from section 6.1.1.2 of this document. Nevertheless, as it will be explained in next section, a problem affected the development of the project.

6.1.2.3. MAIN PROBLEMS AND CONCLUSION

This project, considered as an extension of the Fixed Voice CMDB Update, presented the same kind of problems that the ones already explained. Nevertheless, in this project I was challenged by one additional problem.

This problem was related to the upload procedure. When I started my internship, the Billing per Extension project had already been launched despite it was in a very early phase. On the one side, that means that some modification were already done in the CMDB, and, on the other side, that means that the customer was expecting the project to be finished in a really short period of time, so the customer pressure was high.

The advance of the project was affected by the customer decision of giving us in two different times the list of Cost Center to be applied. When I received the first part of the cost centers I managed to upload the CMDB device per device. I really spent a lot of time choosing the devices to be replaced or deleted from the CMDB, and then adding the new ones.

Nevertheless, after the first update of the CMDB I realized that in order to continue proceeding like this, the best way was to delete the entire database and upload the correct information. In my view, by adopting this procedure we achieved to succeed in both activities at the same time. On the one hand, we succeeded in uploading a single cost center for each user, which means that the goal of the billing per extension project was achieved. On the other hand, by deleting the old inaccurate data from the CMDB and updating the information from the inventory we achieved at the same time the goal of the Fixed Voice CMDB Update.

To sum up, what at the beginning was a mistake was turned into an opportunity to improve the efficiency of my work. This was one of the most important things that I have learnt of this project: “Problems can become opportunities a lot more often than we could imagine”.

6.1.3. Activated LAN Ports CMDB Update

6.1.3.1. Context

The activated LAN ports CMDB Update is a project launched by Telefónica in order to update the DHL CMDB. Despite we have been working locally, it has to be said that this project has been done by the different local offices in many European countries.

The project consisted in detecting the DHL active LAN ports by launching a script, analyzing the information discovered by the script, and finally Updating the CMDB with the active LAN ports detected.

It is important to define what an active port is. The criteria that has been used in this project to consider active and inactive LAN ports is the following: (a) It is considered as LAN active ports: whatever end user physical port that has traffic associated to it; and (b) It is NOT considered as LAN active ports: VLANs ports and ports that manage Access Points (for example Wi-Fi access points).

The technical procedure to detect the active LAN ports was remotely managed from the technical teams based in Madrid (NMC InHouse). In essence, the objective of the script was to detect all the ports with traffic by using the switches host name. The script was launched 6 days once every hour. The days when the script was launched were: 16th, 17th, 18th, 26th, 27th and 30th of June. The script was launched in different days with the aim of having a picture close to the reality. It means that if for any reason an employee was not in his workspace on June the 16th, this employee would be detected when he comes back. Nevertheless, we were aware that with this script Telefónica was not detecting the whole number of ports that DHL is using, but the minimal. Take the example of employees in vacations during the last two June weeks, or an employee in long business trip and note that their LAN ports are not going to be considered as used, so they will not be invoiced. Nevertheless, despite these possible mistakes, the database will be much close to the reality than what it was before the exercise.

In a way, this project could be considered similar to the Fixed Voice CMDB Update, but in this case, with a different type of services involved (not fixed voice devices but data LAN ports).

The objective of this project was double: on the one hand, the goal was to create a clean inventory which reflected exactly the number of LAN ports deployed in DHL sites. On the other hand, the goal of Telefónica was related to revenue assurance purposes because it was suspected that the number of LAN ports being invoiced to DHL was lower than the number of ports that they were using.

The proposed procedure in order to update the CMDB with the correct information involved different Telefónica's departments. My role in this project was the one of the "Data Analyst". Nevertheless, as the service manager was one of my supervisors, I had the chance to participate as well in the misalignments reports and the correction of the reports with the commercial information. So, basically, I had the opportunity to work on this project from the beginning (once the raw data was sent to me) until the end (creating the files to upload the information on the CMDB).

The working procedure is represented in the following flow chart:

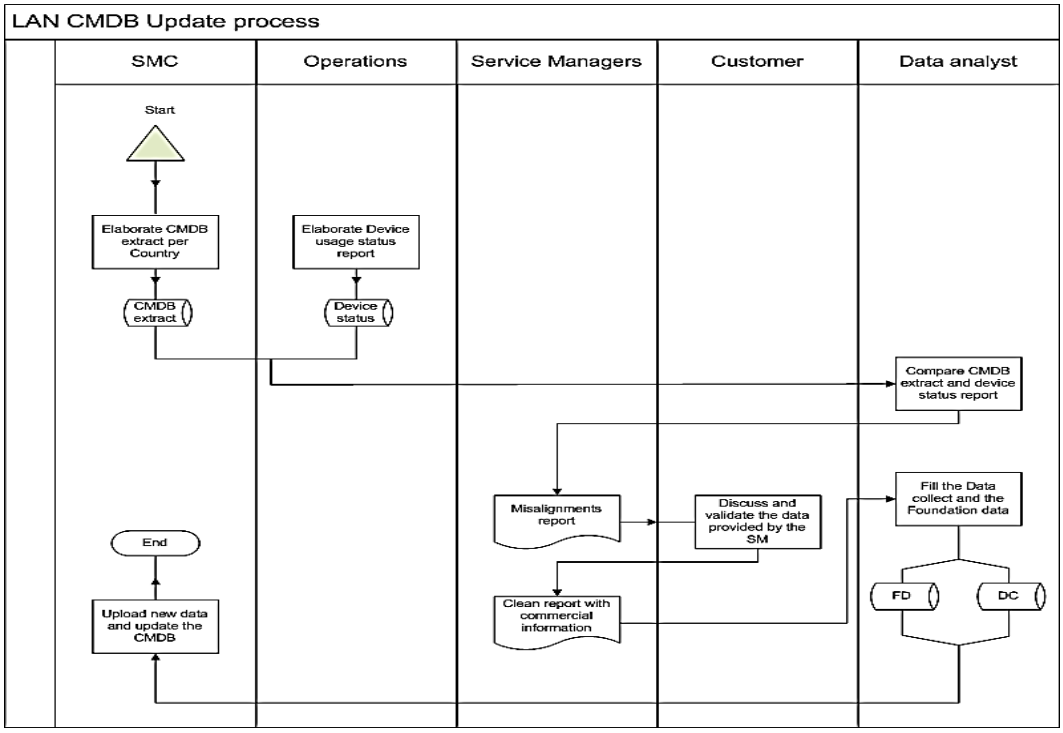


FIGURE 12 - FLOW CHART

6.1.3.2. *PROPOSED SOLUTION AND IMPLEMENTATION*

Phase 1: Active LAN Port Auto discovery

The first phase of this project was managed by the NMC In House (the Telefónica's technical team based in Madrid). This phase consisted in launching a script programmed to detect the active LAN ports by using the switches hostnames. The tool used to discover these active ports was Infoblox.

This script was launched once per hour within 6 different business days: 16th, 17th, 18th, 26th, 27th and 30th of June 2014. This procedure allowed Telefónica to have a "picture" of the minimum number ports used by DHL.

Once the NMC In House received the results from the script, they compiled the information and sent it to me in an Excel file.

Phase 2: Data Analysis

My work started when I received the data from the NMC In House. This first step consisted in doing a first analysis by comparing the data received with the CMDB. On the one hand, I compared site by site the total number of ports in the CMDB and the number of ports reported by Infoblox. On the other hand, I created an accurate inventory with the number of switches per site so I could know the maximum number of available ports. Then, I compared the maximum number of available ports per site with the number of active ports recovered by Infoblox.

Doing the comparison between both files (CMDB and file provided by NMC In House) was not difficult. I used a simple system based in two pivot tables and some Excel defined functions. Probably the most complicated was to analyze once again the cases where mistakes have been produced.

When I checked the information recovered by the tool Infoblox, I realized that in some cases the information of some DHL sites was missing. It means that there were plenty of customer sites in which no active LAN ports had been detected for different reasons. This fact supposed a problem for my analysis because, on the one hand, some DHL sites with LAN services were not detected in Infoblox resume and, on the other hand, there were some sites where Infoblox detected LAN services that were not in the CMDB. The procedure to solve this problem will be explained in next phase "Data integrity and Quality Check".

In addition to the gap analysis, a detailed data hardware inventory was created. To create the inventory I used an asset list provided by the SMC In House and the LAN transformation files that were produced by the Paris Local Office transformation project manager. This data Hardware inventory consisted in putting together in a file all the information concerning the switches deployed by Telefónica in DHL facilities. This inventory allowed me to know the maximum number of LAN ports that could be available in DHL sites.

Phase 3: Data integrity and quality check

Once I checked that no major mistakes had been committed during the analysis (no repeated sites, no format mistakes, etc…) I proceeded to solve the problem of the misalignments between the sites that were in Infoblox data but not in CMDB and vice versa.

After detecting some sites with LAN services in the CMDB but not in Infoblox I explained the situation to the service manager. The service manager always knows exactly which DHL sites are active, which ones have been closed, etc. In addition, he has a clear vision about the services used in each site (e.g. fixed voice services, LAN services, mobile services…).

This first analysis done with the service manager support allowed me to detect in which cases the data provided by Infoblox was wrong (the site was active with LAN services), and in which cases Infoblox was right (the site was closed, no service LAN were deployed in the site, etc…). After this first analysis, we contacted the NMC In House responsible and we asked for more information about the cases where Infoblox was wrong. On the

contrary, for the sites that had been closed, we asked the SMC Prague to give us more information about the decommissioned tickets of these sites.

Finally, with the information provided by the service manager, the new data provided by NMC In House and the information given by the SMC Prague, I was able to finish my analysis and create the documents to share with the customer.

Phase 4: Results Presentation and Negotiation

Once the analysis had successfully been completed, the next step was to prepare the deliverables to give to the customer. The main documents that I prepared in order to deliver to the customer were two: a Power Point Presentation that would be presented during the meeting and an accurate gap analysis site per site and hardware inventory of the switches put in place in each DHL site.

Following the same logic than in the Fixed Voices CMDB Update project, once the results were communicated to DHL, we waited for the data validation and the Cost Center confirmation before uploading the CMDB.

Phase 5: CMDB Update

In order to upload the CMDB I followed a similar procedure than the detailed in phase 4 from section 6.1.1.2 of this document. Nevertheless, within this project, the procedure was slightly more complicated. Basically, the main difference was that when uploading the data to the CMDB it was necessary to detail for each LAN device the hostname and the switch associated to.

6.1.3.3. MAIN PROBLEMS AND CONCLUSION

In essence the main problems that I was forced to solve had already appeared in a way within the other projects. Problems like the delay produced by the customer responses, the data dimension or the mistakes and errors found in the source data have been already explained in previous chapters.

This project has shown me the importance of team working. During this project I have seen that team working is the key to succeed in long and complicated projects. This project was organized in order to take advantage of the strengths of each team. On the one side, the technical expertise of the NMC In House teams was used to perform the script and launch the auto discovery. On the other side, the SMC Prague helped a lot within the upload procedure.

To sum up, I enjoyed a lot doing this project because the fact of being conceptually similar to the Fixed Voice CMDB Update project allowed me to improve all weak points that I detected. It gave me the opportunity to take advantage from the concepts learnt during the first project and apply them to this project.

6.2. AXE 2: DISCOVERING OPERATOR TELECOM ROLES

6.2.1. CROSSCHEK

The Crosscheck Project is a vast European Project managed by the Operation Manager based in the Paris local office. Before explaining which the main objectives of this project are, in the following paragraph it will be explained which the databases that allow Telefónica to interact with the providers are.

Nowadays, in order to provide telecommunication services to our customers all along Europe, and especially in the "off-Net" countries like France, Telefónica has many different providers. Obviously, these providers are paid for this service, and in order to control this relation with them, a system of databases is in place. At the beginning, regarding this databases system, we could find the Provider Database, where all the information related to the services provided to Telefónica is contained. In this database it is possible to find a provider reference of each service, the type of service, recurrent monthly cost, etc… On the other hand, Telefónica uses its database called GAE. This database helps to Telefónica financial services to make the monthly provisions about the amount to pay to the providers. Some years ago, a new System called Sigma was put in place in the Telefónica's organization. Sigma constitutes a third database which helps, among others, with the provider relationship. Nevertheless, in this case, this database contains even more information than GAE. So, to sum up, nowadays there are three databases that interact with the payments and relationships with Telefónica's providers: (1) Providers database, where in the French case we can find provider companies like SFR, Completel, Bouygues Telecom, Verizon…, (2) GAE, that helps Telefónica financial services to create the monthly provisions, and (3) Sigma, the new Telefónica database which is much more complete and is used for many different purposes.

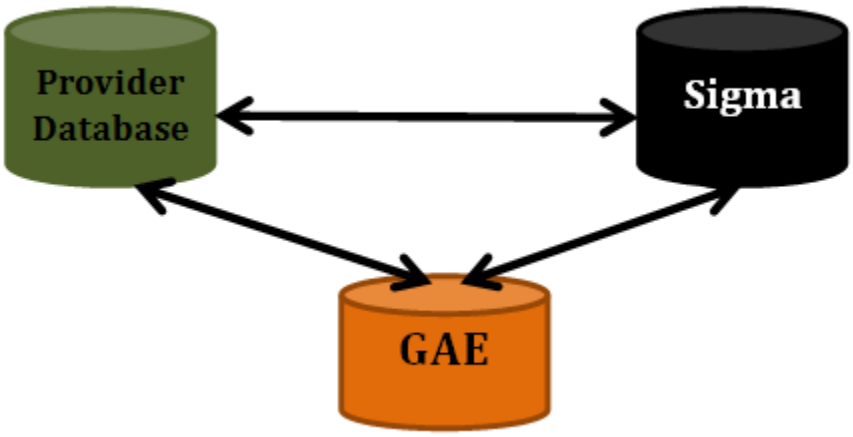


FIGURE 13 - DATABASES

Once the databases system is understood, the next point is to explain the main objectives of this project. As it has been explained in the revenue assurance working axe introduction, the aim of this kind of activities is always to optimize the ratio cost/revenue. With the Crosscheck project, Telefónica is working in the first part of the equation: the costs. So, by implementing this project Telefónica is not waiting for a revenue increase, but

for a cost reduction. The main objectives of this project are 2. The first one is related with provision savings. The idea is to clean up the GAE database in order to reduce the total amount of money blocked every month for provisions. Despite this is not a real saving (provisions will be readjusted at the end of the year) the effect could be important: more money available in treasury to start new projects avoiding borrowing any money, money available in case of contingencies, etc… The second objective will impact directly to the P&L (Profit and Losses) of the company, because in this case the cost reduction will be real. The procedure to achieve this second objective is not to work with the GAE database but with the Provider Database.

During this project, I was in touch with the Operation Manager and the Supplier Manager helping them to achieve the objectives of the project. So in this project, my mission was not "end-to-end". It means that my contribution was limited to certain tasks but without managing the whole project like I have done in other projects such as the Fixed Voice Site Survey or the LAN Update.

Next, I am going to explain the different tasks that I have done related to this project. Once all the tasks will be explained, I am going to finish this section by analyzing the main problems that I have found and the general impression and the key points that I have learnt during my contribution in this project.

Task 1: Creation of the Providers Cross Files. The first task of my mission consisted in creating an output file for each provider in order to have a clear idea about which services are really being used and which ones are suspicious of not being used by our customer. This first task was extremely important because it allowed us to do a first classification between the services that the customer is using and paying, and those services which probably the customer is not paying despite we are paying to the provider. In order to do this classification, I created an algorithm in VBA language that compares the Provider Database with the GAE database. This procedure had to be repeated for all the providers, so I created an Excel Macro easily customizable in order to be adapted to the different providers.

The first step was to schedule a meeting with the Operation Manager to exactly understand her needs. The operation manager proposed me to create a classification system with a first classification with the following options:

- "FOUND": when the provider reference is identified in the GAE database, which means that everything is right.

- "NOT FOUND": when the provider reference cannot be detected in GAE database.

And a second classification with the following options (when a circuit was not found):

- "UNDER INVESTIGATION": when after not finding a circuit an investigation was launched.

- "TO BE CANCELLED": when after the investigation Telefónica is sure that the circuit is not being used by the customer.

- "UPDATE": when a circuit has to be updated in Telefónica Systems.

Thanks to my experience with the previous Excel Macros that I have been doing during the other projects, creating this VBA application was not extremely difficult. The main problem I have found was once again the different formatting of the source data. In order to solve it, I programmed some automatically formatting mistakes detecting and correction functions.

I have tested the application with all the French providers, and after analyzing the results, the application was presented and used in the other European Telefónica's Offices. The idea was that each Operation Manager of the other European offices analyzed their Provider Database. First, they had to launch the Excel Macro that I created, and then, they should complete the analysis with more accurate information about the sites that are not in the GAE files.

Once the crosscheck application was finished, the next step was to compare the output file of this crosscheck (once the data was compared to the GAE file and analyzed by the Operation Manager) with the global GAE file. In this case, the comparison was not just to establish the status "FOUND"/"NOT FOUND" but to find the gaps between the total amount that we are paying to the providers and what we are invoicing to the customer. To better understand this comparison, it is important to define how the data is structured:

In the provider's database, we can find the "Provider Reference" which should be unique for each circuit, and the "Administrative number" which is a Telefónica's reference. We understand that a "circuit" is each device (generally phone lines) provided by our provider. On the contrary, each "Administrative Number" is associated to a site, and obviously a site can contain different circuits. It is important to emphasize, in order to be aware of the complexity of this analysis, that many provider references could be associated to a single administrative number.

The comparison and data crosscheck with both files produced an output file where the gaps between the number of circuits and the different costs for each site were displayed. Furthermore, the output file was completed with additional information such as the customer name and address, postal code, etc…

The main problem that I found during this task was that for a given "Administrative Number" there could be many circuits (different provider references) and sometimes, different providers could provide a circuit for a unique administrative number. This fact means that it was difficult to automatize the data analysis because the information came from different sources and the dimension of the data was different in each case. Nevertheless, by creating some routines in Excel VBA, I succeeded in creating the output file as the Operation Managed wanted.

When the output file was finished, the task of analyzing the information was also a little bit complex. The main problem in this case was that some mistakes were detected in the two databases that we were working with. That meant that when analyzing the output file we were not sure about the results because of the problems of the data source. The lack of accuracy of the source data has generated plenty of problems during this mission, as when a gap between what we are paying to our provider and what we were provisioning was extremely high, we did not know if it was really a gap or just a mistake in the source data. In order to solve this problem, the Operation Managers focused on the top 20 circuits sorted by the potential costing save. Using the results of the Excel application they

investigated in more detail these potential savings by contacting the central services based in Madrid, by contacting our provider, etc…

During this project I realized that when doing just a part of a project, without having visibility of the rest of the project, the mission could be harder. The fact of not knowing exactly which the next steps of the project will be did not allow me to propose new ideas or solutions, so I felt that my contribution was a little limited by doing what the Operation Manager told me to do.

This project helped me to figure out how complex is the organization of a project that affects countries all along Europe. I had the opportunity to see how bureaucracy slows down a project. On the other hand, however, I understand that some level of bureaucracy is important in a big organization like Telefónica, because it is necessary to coordinate multiple countries and align the objectives of different parties that sometimes could differ. Furthermore, this project helped me to be even more convinced about the importance of organization and time management when doing a project.

6.2.2. Cost Report

The Cost Report project consisted in creating an application to automatically produce a report and perform an analysis of the customer's invoice. The benefits of this project are double. On the one hand, this is a tool to be used by Telefónica team in order to detect and prevent possible mistakes in the invoices produced. Furthermore, with this tool Telefónica's teams could have the possibility to easily visualize the consumption and subscription trends of the customer, the most profitable services, etc… On the other hand, this information will also add value to the service provided by Telefónica to the customer, because when presenting the monthly invoices, Telefónica could explain it in an attractive way.

The input data for this application are the invoices that Telefónica emits and sends to the customer monthly. The application contains an algorithm to translate and classify each line from the invoice to a resource unit existing in the service catalogue. Once the data is successfully classified, a system of tables permits to create the different figures and graphs. Finally, and output file will be created by the account manager in order to present to the customer the most significant figures and ratios. This file could be produced as a standard "pdf "file or in any other format.

The main idea of this tool was to create a full customizable application which allowed Telefónica's teams to obtain all the requested information about the invoices with different detail levels. At the very begging, this application was just conceived to be used with DHL. Nevertheless, with just some modifications of the macros, the whole structure could be adapted to any other customer.

As in the previous projects, this one was also implemented by using VBA language. In the following paragraphs the details of this project are explained, paying special attention to

the most conflictive phases. Finally, a conclusion of the project is written to analyze the major problems found and my overview of this project.

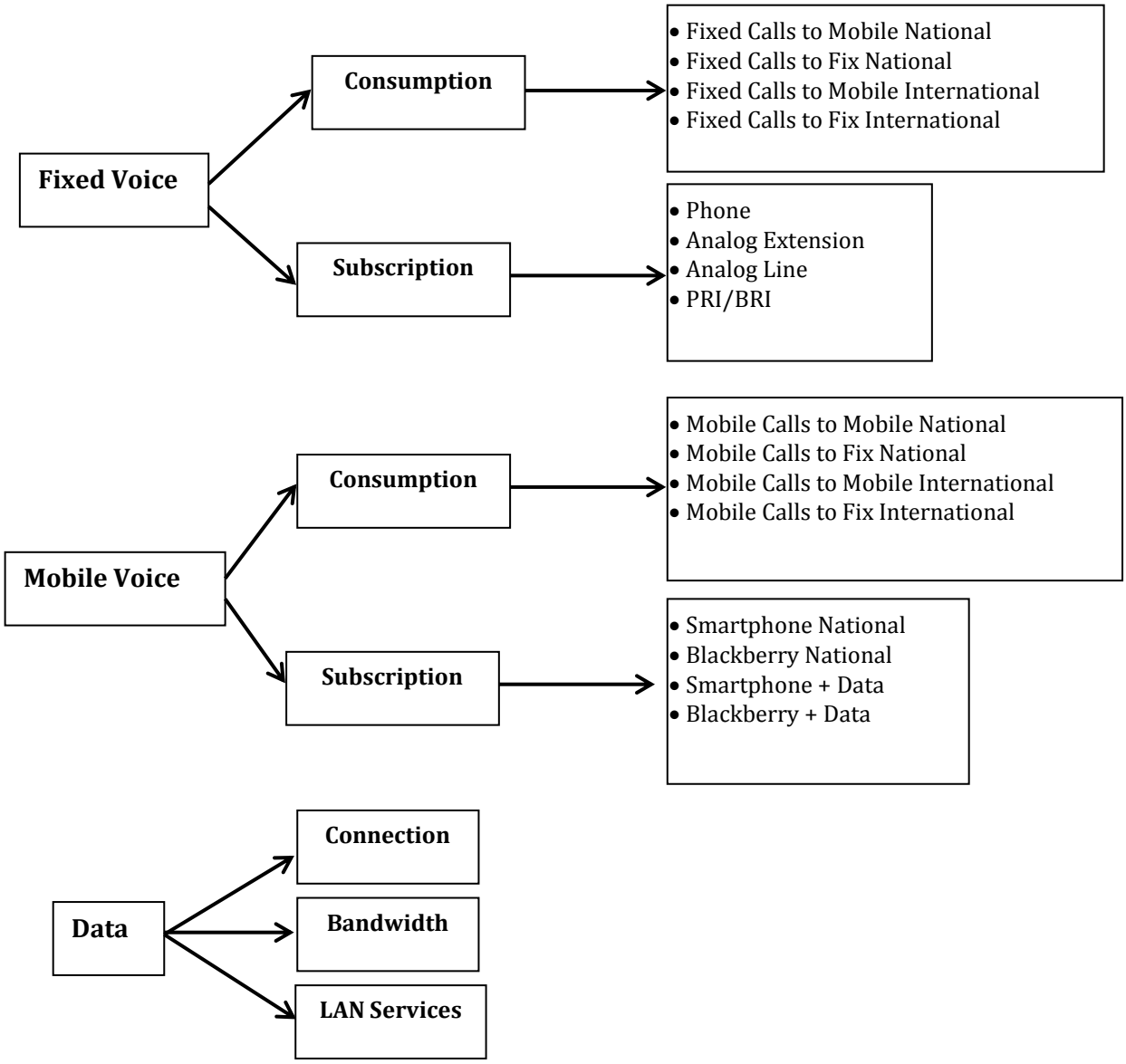
Phase 1: the first point of this project was to understand what the account managers for DHL exactly wanted. For this reason we scheduled a first meeting where they provided all the necessary information to develop my task. Within the main exigencies were:

- Create a tool that shows the annually trend evolution in order to detect an increasing or decreasing behavior in the different service consumption all over the year.
- The tool must also perform a monthly detailed analysis. It was important not just to give a qualitative analysis showing the annual evolution using graphs but to go in deep of the monthly invoice (total number of phones, total volume and cost of roaming calls, total volume and cost of national calls, etc…)
- The global overview of the application was also predefined: A general overview of the whole invoice had to be created in the first sheet of the Excel file, and then each service tower (Mobile Voice, Fixed Voice and Data) had to appear in different sheets.
- An executive analysis had to be performed each month and added in after the main figures. Finally, a user guide was also requested.

Phase 2: once I was aware of the needs of the account managers, I developed a proposal and I scheduled another meeting to present it to them. Once we finished discussing about the details, I was ready to start developing the algorithm to classify all the items from the invoices and the structure to automatically create the figures each time the application was launched.

Phase 3: Developing the algorithm. This phase was really the core of the project. Within this phase I conceived and created what it will be the vertebral column of the application. Below are described the different steps followed to conclude this phase.

- **Step 1:** the first point was to decide how to store all the data in order to be able to produce both: a monthly analysis and an annual analysis. It was extremely important to be able to preserve the integrity of the previous month incomes, avoiding downloading them every time that the application was launched. So I decided to create a store hidden sheet in the Excel file where all the information was stored month by month.
- **Step 2:** once the storage problem was solved, the next step was to create the working structure. It was conceived as follows: (1) each new invoice had to be added to the application, (2) the Excel macros would analyze each single line from the invoice and would classify it in main categories (mobile, fixed voice or data), then a second classification depending if the item is "consumption" or "subscription" would be also done. Finally, a detailed division would be done. (For more detail about the classification algorithm see figure in next page). (3) Once the classifications in subcategories had been done, the information was automatically sent to the different Excel tables existing in the different sheets. (4) Finally, the graphs and trend calculus were automatically done.



- **Step 3:** Graphs and figures display. This step consisted in creating a group of graphs that added value to the analysis. First, I created an excel sheet for each service tower plus a global one for the analysis of the whole invoice. Then, I decided which the most significant graphs to be shown were and where and how they should be represented (bars, lines, circular…). We realized that a double analysis concerning on the one side "Volume" and on the other side "Cost in €" would be a great representation of the invoices.
- **Step 4:** Once the main structure was defined, I was focused on creating an executive analysis, which means to summarize in simple figures the main financial aspects. To do that, I created another sheet in the file which allowed completing this analysis showing just the key figures. The following image shows the structure of the application in a more visual way.

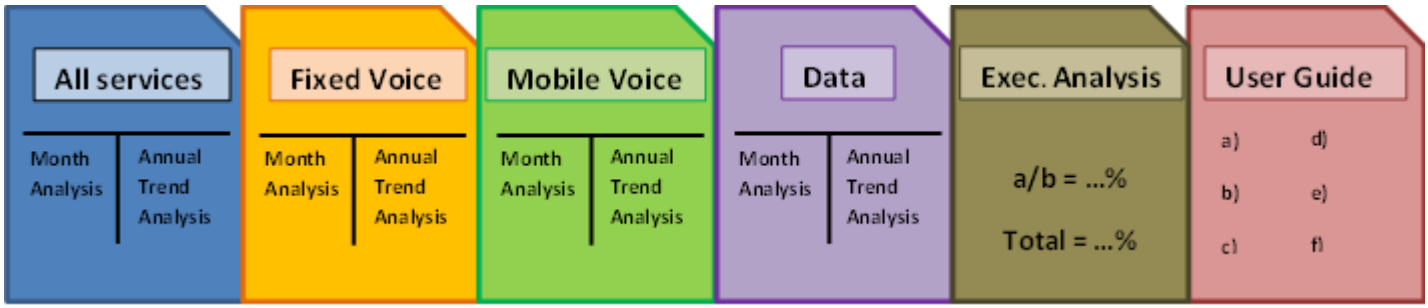


FIGURE 14 - APPLICATION STRUCTURE

Phase 4: When the algorithm was designed, I focused on the development in VBA. In my view, this time the hardest was to define the whole structure of the application (did in phase 3). During the developing phase no major problems appeared. When the main aspects of the application were done, I spent some time testing the correct functioning. Despite the main lines worked properly, I was forced to do some changes to the original version. The main problems occurred because of data format problems.

Phase 5: Once the application worked as expected, I focused on giving an attractive view to it and I wrote the user guide. Finally, the application was sent and presented to the account managers. The following image shows a real view of the "fixed voice analysis" sheet from the application.

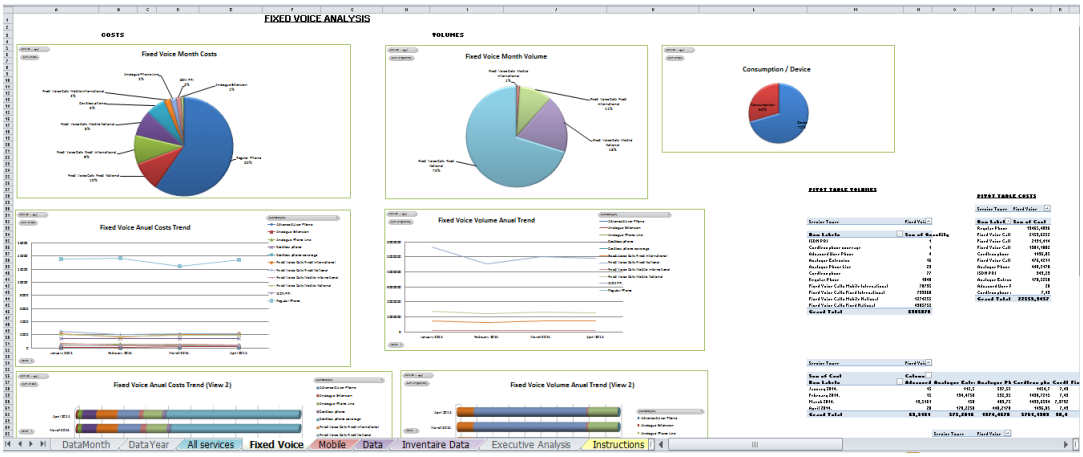


FIGURE 15 - COST REPORT OVERVIEW

Different source data formats are among the main problems that I had to deal with during this project. The different formatting produced some mistakes when launching the application. The first step in order to solve the format problem was to adapt the "storage sheet" to the particular structure of the source files. Another important problem that could take place in a near future is that if some new services are invoiced to the customer, perhaps the application cannot classify them automatically and it will be necessary to add new instructions to the classification algorithm.

The report structure and the code details were presented to the SMC Prague reporting team in order to allow them to give support to TGS Paris with this report.

From a personal side, this project was very motivating for me because I was dealing with financial activities and this is an area which I like so much. The project let me know how financial reports can be created and which the main information that has to be shown is.

6.2.3. MANAGEMENT PROJECT – SAASWEDO

SaaSweDo, as previously explained in chapter "TOOLS", is a Telecom Expense Management specialized company. The company offers SaaS (Software as a Service) solutions to the customer. This "new" software concept allows the user to access the application via Internet without installing any program on their computers. Despite this small difference, these types of product are quite similar to the other standard software solutions.

Despite Telefónica and SaaSweDo have been working together before the beginning of my internship, the services provided by SaaSweDo were neither clearly defined nor fully implemented.

The main objective of this project was really different from the previous explained projects. The aim was not to create or develop an application nor analyze any data. In this case, I was mainly in charge of management tasks. My objective on this project was to warrant the correct development of the application MyTem360 and support my supervisor in relation with this topic. As explained in chapter "TOOLS", MyTem360 is a SaaS solution provided by SaaSweDo which allows Telefónica to manage their telecom expenses. It means that using this application Telefónica will save plenty of time because the data collection and analysis will be automatically done by the application. As a difference from the other explained projects, in this one, I adopted a pure management role during the whole project. Nevertheless, I should emphasize that despite it was extremely important for me (it was my first management experience in professional world) the size of the project was not enormous. It only consisted in following the implementation of a very basic group of services. In the following paragraphs, I am going to detail the main tasks and phases of the project.

Basically, the project consisted in two main activities. First, in order to allow our customer to order using MyTem360, it was necessary to define the service catalogue. This service catalogue contained all the services, devices and options that Telefónica provides to the customer. For this reason it was important to provide to SaaSweDo with the service catalogue and define with them which options would be available for each final user (i.e. manager, employee, etc…). Secondly, MyTem360 should provide to Telefónica all the detailed information about the telecom park, the expenses of each phone/data line, etc… Furthermore, this application should analyze all the data and create periodically different kinds of reports. The procedure to obtain the data was simple: each time that an invoice was emitted by our telecom providers (SFR, OBS, etc…) a copy was automatically sent to SaaSweDo. Then, they analyzed the data and provided us some graphs and reports.

Phase 1: The first task to be done in this kind of project was to understand exactly what had to be done. Once I had a clear vision about the context of the project, we set up a

meeting with the SaaSweDo project manager, my supervisor and me. During this meeting I was introduced to the SaaSweDo responsible and we started to work in defining the service catalogue. A training for me to learn how to use the tool MyTeam360 in an advanced level was arranged.

Phase 2: Training. In order to be able to follow the advance of the project and check if everything was done successfully I needed to know how the application worked. For this reason I assisted to a two days training in the SaaSweDo office. There, I learned the different possibilities that MyTem360 offers to the users. It was a really helpful training which helped me to feel more comfortable when using the application.

Phase 3: the third phase was focused on following the updates of the tool. During this phase I assisted to all the meetings between Telefónica and SaaSweDo. Furthermore, when necessary, I set up meetings with the SaaSweDo project manager.

As it is comprehensible, this project was not exempt of problems. Nevertheless, there were two main problems that complicated a lot the success of this project. The first one was related to the tool itself. After analyzing the results provided, we found that the added value that MyTem360 was providing to Telefónica was below the expectations. On the one hand, the analyses were not exactly what we were expecting, and on the other hand, we realized that probably the same kind of analysis could have been done by our central teams in Madrid. The second problem that affected (and in fact stopped) the project, was the invoices received from SaaSweDO. On the one hand we detected mistakes in the invoices, and on the other hand, there were disagreements between my supervisor and SaaSweDo in relation to the total amount to be invoiced. The problem was merely if the items to be invoiced should the phone lines (as Telefónica expected) or every single row from the invoices that SaaSweDo received from Telefónica telecom providers.

Being responsible of this project gave me the opportunity to discover another type of activity much more focused in management than in technical tasks. I enjoyed when assisting to the meetings with SaaSweDo and the results of the advance of the project were visible. In my view, I was lucky to work with a great project manager from SaaSweDo. I can imagine that this kind of projects could be extremely stressful when the third parties do not respect the delays.

Thanks to this project I learned to manage meetings by myself (without the presence of anyone else from Telefónica) and it gave me the opportunity to discover which the main working axes of a project manager are.

6.2.4. BUSINESS TECHNICAL CONSULTANT

During my internship I have been doing some tasks in the Business Technical Consultant department. These tasks were grouped in two main missions. The first one consisted in supporting the quotation procedures. The second one was related to the creation of an Excel application to automatically calculate the cost of the installation of a router taking on account the different parameters.

QUOTATION BTC

The BTC department is in charge of the quotation of the telecom services. It means that when a customer wants to create or move a site, or add some services to an existing site, it is necessary to forecast the telecom costs of the installation and the monthly recurrent costs to be able to present an offer. This department uses different tools that provide them the information to create a technical offer adapted to the needs of the customer.

In essence, the quotation procedure is not extremely complicated. Nevertheless, it uses to take a lot of time depending on the number of services to be quoted. This procedure works as follows: first, the customer request is sent to the BTC department. Within these requests the site details and technical information are described. The second step is to begin the test eligibilities and checking if the requests of the customer can be implemented and deployed by Telefónica. Once the BTC department is sure that a technical solution could be deployed in order to provide the requested telecom services, the next step is to check the price list in order to try to find the cheapest configuration. Finally, once the technical and financial information are optimized, the files are sent waiting for the customer validation.

My mission supporting the BTC department consisted in doing the quotations for de xDSL services. Despite the quotation process is quite vast; I was only focused on testing the eligibility and optimizing the offer price. So, the technical designs and configuration were not proposed by me.

Next, I am going to detail the main steps that I should follow each time that a quotation task was requested to me.

Phase 1: once I received a quotation xDSL request, the first step was to check that the information provided was complete. The second step was to check the eligibility of each one of the numbers provided to me. It is necessary to check the eligibility of each number because depending on the physical location, the bandwidth available could be more or less. For the xDSL eligibility procedure I used basically two providers: SFR and Bouygues Telecom. In order to be able to test the eligibility, I was authorized to use the provider eligibility test applications: India for SFR and Elisa for Bouygues Telecom. To give an example about the view of the application, I did an exercise checking the availability for a random Paris telephone number. When using the SFR test eligibility application the view we obtain is shown below:

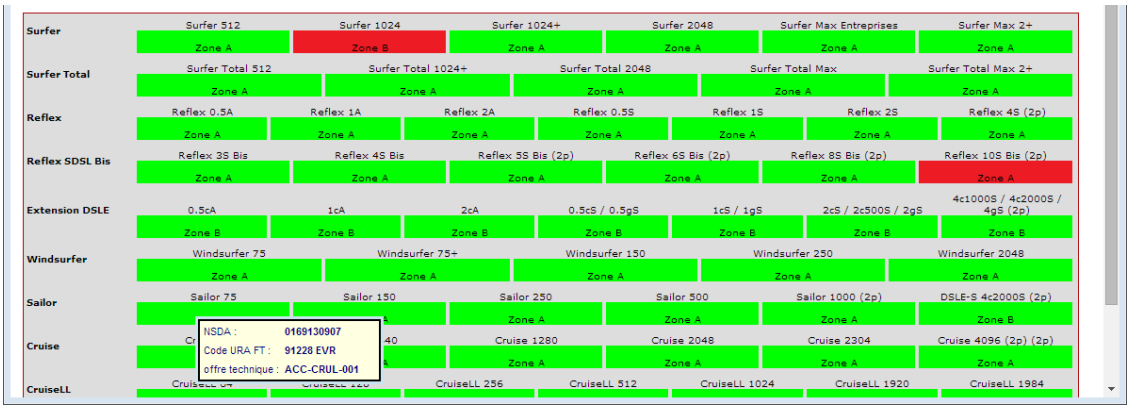


FIGURE 16 - QUOTATION RESULTS

As it can be observed, the image shows different options with a code color. When an offer is highlighted with red color it means that this is not available. On the contrary, when it is highlighted in green, it means that the number is eligible. Once the number was introduced to the application, the provided could automatically detect the eligibility with a delay of just 1 or 2 minutes. After obtaining the results of the test, the first step to do was always to check if the address of the physical phone line was the same that the provided in the request. Within this phase, when the max bandwidth was higher than the bandwidth required, there was no problem. On the other side, when the standard xDSL offers were not available, I had to manage to find a solution by trying to find alternative options or even consulting other providers.

Phase 2: once the eligibility test was successful, the next phase consisted into proving a price for the installation and another one which was equivalent to the recurrent monthly charges. In order to do that, once I decided which the offer that fits the best with the customer request was, I had just to check in a pricelist the price of the chosen offer. Finally, the last step was to send my quotation results to the BTC manager.

This mission was probably one of the most technical ones, because I needed to know the different types of xDSL options available and other technical alternatives. Despite I did not dedicate a high percentage of my internship time to this mission, I learnt plenty of details about xDSL configurations. It was really interesting for me to know how the telecom services are quoted because this work makes a relationship between the financial and the technical viewpoints.

If I analyze the main problems that I had had during the mission, I should say that learning how to use the test eligibility application and understanding the quotation procedure was not complicated. Probably the most difficult part of this mission and which gave me more problems at the beginning was the fact of getting familiar with the different kinds of technical solutions for xDSL services. Despite I had a solid basis in telecommunications technologies acquired in the university, I had to spend some time reviewing and learning xDSL technical details that I had not learnt during my student years.

INSTALLATION ROUTER COST APPLICATION

The second mission that I developed in the BTC department was related with the router installation activities. Each time that a router is installed, it has to be connected to one of the main cities where the facilities that Telefónica can use are deployed. These main cities are: Paris, Lyon, Marseille and Lille. The further far from these cities the router should be installed, the more expensive will be the installation. Once the BTC manager explained me the whole quotation process, I rapidly identify that an improvement could be to create an application to automatically calculate the extra installation costs due to the distance to the main cities. To help them in their daily tasks, I proposed to create an application which would automatically calculate this cost. In order to create this application I used Excel VBA language.

Next, I am going to explain how I created the application detailing the main point but without entering too much in the code details.

Phase 1: As I learnt from other projects done before, I spent some time thinking on the best way to proceed. First, what I need to find was a complete database which contained the GPS coordinates for all the cities in France. Then, instead of starting programming, the main point was to find or develop a formula to convert and calculate distance using GPS coordinates. During my research, I found many websites where the conversion was done automatically, but the problem was that I needed to program the formula by myself in order to use it in the macros. Finally, I managed to obtain a mathematical expression to make a relationship between GPS coordinates and longitude and latitude coordinates and I decided to use the following formula in my code:

```
dLat = deg2rad * (latitude2 - latitude1)
dLon = deg2rad * (longitude2 - longitude1)
A = Sin(dLat / 2) * Sin(dLat / 2) + Cos(deg2rad * latitude1) * Cos(deg2rad * latitude2) * Sin(dLon / 2) *
Sin(dLon / 2)
c = 2 * WorksheetFunction.Asin(Sqr(A))
d = earth_radius * c
```

Phase 2: Once the formula was translated into code, the next step was to create an algorithm to calculate the distances and then to determine which the nearest main city for each village was. Then, using the restrictions dictated by the BTC manager I managed to calculate the extra cost. The main point to be modeled was that when a village was more far than 300 km from a main city, the application should add a fixed quantity (in €) per kilometer after the first 300 km.

Phase 3: once the procedure was successfully modeled, I proceeded to create an easy interface to allow the BTC department to use my application easily. Despite I started to feel comfortable programming in VBA, I had never created an interface in VBA before, so I started by learning how to create one. After reading some manuals and picking up some information from forums, I managed to create the interface. This interface permitted the user to choose the village where the router has to be installed from a list, and then, the application calculates and automatically provides the following information: (1) Nearest Main City, (2) Distance to the Main City, (3) Extra cost to be added to the router installation quotation. Above there is a picture from the view of the interface created:

FIGURE 17 - ROUTER COST CALCULATOR

The main problems that I found when doing this mission were of two types: The first one was related to the implementation of a mathematical formula which allows the conversion from GPS coordinates to longitude and latitude coordinates. The second problem was in relation with VBA language because at the beginning I did not know how to use and create VBA formularies. Nevertheless, these two problems were relatively easy to solve and I was finally able to create the application in a short delay.

Once again, working on this mission allowed me to improve my programmer skills, but this time I had to deal with mathematical and physical concepts (GPS coordinates). Participating in this mission was a great experience for me because it was a mission proposed by myself. On the one hand, I had seen how my ideas and proposals were took in account by the others employees, and on the other hand, I felt really helpful for the BTC department because the application will help them to save time in the future router quotations.

7. ORGANIZATION

After the professional experience acquired working in Telefónica, I realized that one of the main points to succeed in completing the tasks is organization in a large sense. When I affirm that organization is really important for the quality and the delay of a project I am referring to three main aspects: (1) Time Management, (2) Communication, and (3) Procedures.

Within this chapter I am going to explain how I managed with these three points.

Time management

From the very beginning of my internship I realized that one of the current problems of all my work mates was that they had to do plenty of things at the same time. This problem affected me as well when I started to assume more responsibilities and I was in charge of more missions. The fact is that when working in a project, it comes out always an e-mail with something "extremely important and urgent" to be done. The first time that I was in this situation I felt really stressed, but after discussing with my supervisor, he gave me the key to succeed in this kind of situations: to establish priorities. From this moment, I used a tasks list where all my pending tasks are noted, and each time that I receive a new task to do, I evaluate the priority of the task and I classify it within my task list. Using this tool helped me to manage my time more efficiently, avoiding wasting any second by being collapsed by a "stress attack".

Despite the task list was extremely useful to plan and manage my tasks, during my internship I have been using the Microsoft Outlook Calendar in order to fix meetings with my supervisors, the customer, other workmates, etc. Step by step, I learnt the importance of time management while meetings as well. I realized that many times meetings start and finish late. There are many reasons that could explain the delays of the meetings, but in my view, in order to take profit of the meetings and to avoid wasting time, time management in meetings is crucial. I had the opportunity to experience by myself the differences between a meeting managed correctly (with an agenda shared with the participants before the meeting and with a moderator who leads the meeting) and a meeting managed in a wrong way. In relation with this topic, next section will be dedicated to define the different types of meetings that I assisted to during my internship and how each of them was planned.

Nevertheless, before starting with next section, I would like to explain my organization related to the deliverables required by Telecom Bretagne. As with the other projects, I established a calendar with all the documents (and deadlines) to be sent to Telecom Bretagne. The figure shown in next page is a graphic representation of the main dates and deliverables that I had to attend. This figure was created when defining my internship plan and it helped me out to be aware of the deadlines and be sure that I did not forget anything.

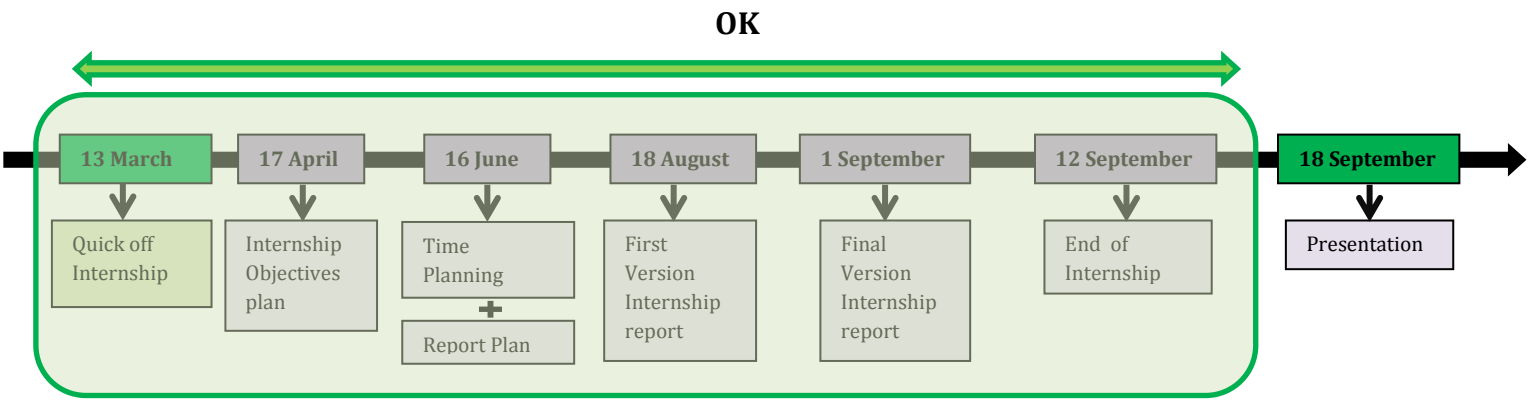


FIGURE 18 - CALENDAR

Communication

A second extremely important aspect when working in a professional environment is communication. Despite there are plenty of ways to communicate, I strongly believe that the best one are meetings, and if possible face to face meetings.

During my internship I had the opportunity to participate in plenty of meetings: internal meetings, customer meetings, internship recurrent meetings, etc… Next, I am going to explain the main types of meetings that I attended. I have classified the meetings in two categories: (1) Internal meetings; and (2) Meetings with the customer. At the same time, internal meetings could be split into different categories.

Internal Meetings:

- **Internship Follow Up Meetings (Formal and Informal):** at the beginning of my internship I scheduled one meeting per month with my supervisors. The main objective of these meetings was to discuss with my supervisors about the status of the projects that I was working on. Within these meetings I used a Power Point support to lead the meeting efficiently. The power point contained a list of the main projects that I was working on and a list of actions and deadlines for each of these projects. At the same time, the meetings allowed me to discuss with my supervisors about my motivations and my doubts. In addition to these meetings, once a week I used to have informal meetings with the supervisors. These meetings were really helpful but in a different way. While the formal meetings were used to review all the projects, the informal meetings were basically used to discuss about alternative procedures to complete the tasks. Also, I used the informal meeting to ask plenty of questions concerning different topics like: Telefónica, the telecom sector, the current technologies used in telecom services…
- **Operational Meetings**: this kind of meetings took place almost every single day and they were strictly operational, which means that they do not have anything to do with the formal requirements of my stage. Within these meetings I discussed with the other employees about topics related to the projects which I were involved. Almost all the projects that I worked on required the coordination of different employees and by attending to the meetings we had the opportunity to share the status of each part of the project.

- **Country Review Meetings**: these meetings took place once per month and their main objective was to share between all the Local Office employees what was being done in the office. It is important to note that the Global Extended Offices director assisted to these meetings. So these meetings constituted a great opportunity to show them the work done by the French Local Office and to discuss with him the main blocking points and problems of each project.

Customer Meetings:

On the other hand, I assisted to external meetings with our customer as well. Basically I assisted to all the meetings where the status of the projects that I was working on were planned to be discussed. It means that almost once every two weeks I had a meeting with a customer. These meetings were really interesting for me because I learnt a lot from the different assistants: CFOs, IT directors, Operational IT managers, etc… As explained when describing each project in chapter "Projects Done", I was in charge of the presentation of the results of the projects that I was working on.

Procedures

Finally, I think that in order to succeed when working in teams, it is really important to fix working procedures and to be aware that all the people involved on the project understands and follows the procedure. During my stage I learnt that working following a procedure is extremely helpful when many people is involved in a project. Despite procedures are basically used in order to coordinate different people, I also tried to apply procedures to my daily tasks in Telefónica. Using procedures helped me to avoid committing mistakes especially in repetitive tasks, like preparing the files to be uploaded, analyzing the row data, etc...

To sum up, I would like to emphasize one more time the importance that I think should be accorded to organization when working. In my view, a high percentage of the success of a project depends on how the three points previously described are managed.

8. CONCLUSION

During this internship I had the opportunity to work with really talented people, in really interesting projects in a great company. This six month internship has been extremely useful in order to synthesize the major concepts learnt in the university. In addition, the fact of doing my internship in a foreign country has helped a lot to improve my language skills.

On the one hand, by doing the projects related to the revenue assurance working axe, I had the opportunity to be involved in a discipline which I consider extremely interesting. By working in the revenue assurance projects I developed my programming and analytic skills. At the same time, thanks to these projects I understood the importance of team working and organization when being involved in major projects.

On the other hand, the projects related with the second working axe were much diverse and allowed me to have the opportunity to go in deep to different departments of a telecommunications service provider company.

As it has been explained in chapter 8, I attribute a special importance to "organization". I strongly believe that time management (individual organization) and meetings and procedures (group organization) are extremely relevant factors on work.

On a personal side, I enjoyed a lot doing this internship. I feel very lucky about the subject and the different projects proposed to me. As it has been explained within the previous chapters, despite at the very beginning I was not too excited about the idea of programming, the effort of learning VBA was ridiculous compared to the great benefits that it provided me.

As it has been detailed within the chapters of this document, during this internship I have been involved in different kinds of project. This fact allowed me to learn and discover about the plenty of roles that are developed in a company and opened my mind when thinking about future career opportunities.

At the same time I realized that student and professional world do not differ as much as I thought. One of the major points that I have learnt during this six month is that motivation, solidarity, organization and hard work are the indispensable keys to success not just in school and work but in life.

I strongly believe that Telefónica Global Solutions is a great place to work and it has been with no doubt the best place to do my final degree internship.

9. ACKNOWLEDGEMENTS

While I am writing these lines my internship is really close to its end. When I look back, I realize that within this six month plenty of things have changed in my life. At the present time, I feel extremely grateful with all the people that helped me through this trip.

I would like to express my gratitude to my Telefónica's supervisors, who gave me the opportunity to do my internship with them. My supervisors took care of me during my internship, they taught me plenty of useful things and gave me some sincere life advices that I will never forget. I have learnt a lot with them. After these six month I can say that both of them are extraordinary people, not just in professional but also in personal domain. I guess sometimes luck plays an important role in life, and I feel extremely lucky for having been supervised by these two exceptional people: Nicolas Pasquet and Hakima Bouklachi. I can just say one thing to you: Thank you. I really hope that life will give us the opportunity to work together again.

I would like to take this opportunity to express my deepest gratitude to my school supervisor Nicolas Jullien. His support and guidance started much more time before this internship.

Finally, the completion of this internship would have been much more difficult without the support and encouragement of each one of the office workmates. To all of you: thanks.

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11. APPENDIX

Macro 1: “Principal plus Cordless”

```
Dim Archivo As String
Dim Ruta As String
Ruta = "C:\Users\762BGV1\Desktop\CONCATEN\"
k = InputBox("Introduire le numéro du primer fichier", "Numéro fichier")
l = InputBox("Introduire le numéro du dernier fichier a actualiser", "Numéro fichier")

For i = k To l

Archivo = "a (" & i & ")" & ".xlsx"
Direccion = Ruta & Archivo
```

Macro 2: “Concatenate”

```
//……..//
Workbooks.Open Filename:=Direccion
Sheets("Users").Select
If ActiveSheet.FilterMode Then ActiveSheet.ShowAllData

UltimaRowCopy = 0
UltimaRowA = Cells(Rows.Count, "A").End(xlUp).Row
//……..//
UltimaRowN = Cells(Rows.Count, "N").End(xlUp).Row
UltimaRowCopy = WorksheetFunction.Max(UltimaRowA, UltimaRowB, UltimaRowC, UltimaRowD, UltimaRowE, UltimaRowF,
UltimaRowG, UltimaRowH, UltimaRowI, UltimaRowJ, UltimaRowK, UltimaRowL, UltimaRowM, UltimaRowN, UltimaRowO,
UltimaRowP)
Range("A" & "3", "P" & (UltimaRowCopy)).Copy
Range("A1") = Ultima
Workbooks("principalplusCordless.xlsm").Activate
Sheets("Users").Select
//……..//
LastRow = 0
//……..//
LastRowP = Cells(Rows.Count, "P").End(xlUp).Row + 1
LastRow = WorksheetFunction.Max(LastRowA, LastRowB, LastRowC, LastRowD, LastRowE, LastRowF, LastRowG, LastRowH,
LastRowI, LastRowJ, LastRowK, LastRowL, LastRowM, LastRowN, LastRowO, LastRowP)
Range("A" & LastRow).Select
Range("A" & LastRow).PasteSpecial
Application.CutCopyMode = False
LastRow = 0
Workbooks(Archivo).Save
Workbooks(Archivo).Close
```