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BEING A CHOICE ARCHITECT IN PROJECT MANAGEMENT:

THE GALP ENERGY EXAMPLE.

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ABSTRACT

In a world where managing projects is a difficult task that requires several skills to succeed, several authors studied ways to prevent a project from deviation of its desired final outcome.

This works intends to study the Choice Architecture tools presented in the book "Nudge", through the development of an internal project at GALP energy, to present some key points to assess before its development, related with the need to manage the environment in which the stakeholders will work on the project. The main idea consists in preventing some behaviors and decisions that could lead the project development away from a desired outcome. Managing that environment where the choices are made is known as being a Choice Architect.

To begin, this work will focus in knowing the company GALP energy, and where specifically the project progress.

Once the global environment understood, the main project objective is unveiled, explaining the problem to be solved, the research done to solve it and how can the choice architecture be applied.

Afterward, a specific study is presented on the way the choice architecture contributed for the final solution, justifying the importance on knowing how the brain work, and how the decision biases and heuristics can contribute for the choice architecture successful influence on the elaboration and protection of a project desired solution.

To conclude, the project final result and the experience obtained from this work are explained justifying the reason that made this project to be considered a success by several persons. The reason of success is given in the end by the key clients and persons involved in the process.

Keywords: Project Management, Biases and Heuristics, Choice Architecture, IT implementation.

System of Classification JEL: L72; M15

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EXECUTIVE SUMMARY

One of the main factors for a project deviation, and object of study in this work, is caused by the most important asset of its development – People. In a project development, the human resources including the project manager itself are influence by several aspects in the environment that surrounds them which can lead the project away from the desired final outcome, as consequence of a lack of proper formation, skills, lack of attention to some minor details, decision biases and heuristics, among other possible reasons for failure.

This work idea consists in studying the choice architecture application designed by Richard H.Thaler and Cass R.Sunstein on their book "Nudge" 2008, and complement it with some understandings on how does the Human brain usually work or act, in the project development inside the Galp energy company. The choice architecture emerges as a solution to minimize errors, mistakes and nudge people toward their optimal point, by managing, not manipulating, the environment in which the stakeholders involved in the project make decisions. The errors and mistakes are further known as the decision biases and heuristics explained and managed on this project.

The project itself consists in developing a new solution to archive the investment projects further referred to as the FIP. A new solution to archive the FIP was necessary since the project folders related with the refining investments have reached the maximum physical library capacity available, and therefore more physical space was needed. However this situation would increase the costs which the company intends to avoid. Nevertheless other problems are present like, the time spent by each employee to find a specific file within a specific folder, the difficulty to track the investment projects within the approval workflow, and some errors in the fulfilment of official documents to approve and manage the investment projects. Most of the problems presented are consequences of decisions biases and heuristics, like for instance the post completion error which is a specific form of omission error occurring after some task goal has been accomplished[1], common within the approval workflow of the FIP when the investment projects managers forgets specific steps in the middle of the process, like updating the database to track the projects in the workflow.

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[1] Byrne, M. D. & Bovair, S. (1997). A working memory model of a common procedural error. Cognitive Science,21, 31-61

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Therefore the plan and object of research is to detect and minimize the errors and inefficiencies within the FIPs archive and approval workflow, designing through the choice architecture a solution that prevents the decision biases and heuristics to affect the project progress, stimulating behaviors toward a proper archive of the FIP.

The main tools of the choice architecture are used and explained, to guarantee that the stakeholders maintain their freedom of choice avoiding the possible effects of the choice architect own biases. The tools used are: the default option, expectation of error, the necessity to give feedback, understanding mappings, the structure of the complex choices and incentives. Once the tools explained and examined, the decisions biases and heuristics found in the process are associated to each tool of the choice architecture allowing a design of a process to solve the archive and workflow problems presented. This solution, changed the software, methods and working habits of each persons involved. That situation made this project an example of achievement in the company, and serves as a contribute to the scientific community to study and complement their works in managing projects, changing cultures, reducing inefficiencies and managing the environment in which the stakeholders make decisions nudging them to their welfare through the use of the choice architecture.

In the end, this project that was limited to a specific department served as an example to improve others and became an internal success at GALP Energy.

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ACKNOWLEDGEMENTS

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FIGURES INDEX:

LIST OF ABBREVIATIONS:

CAC – Cortex interior cingulated

CCGT – Central of Combined cycle of natural gas

CPC – Corporate Planning and Control

CLC - Companhia Logística de Combustíveis, S.A

CLH - Compañía Logística de Hidrocarburos

FAQ – Frequently asked questions

FIP - Folder of the investment project

GALP Energy – GALP ENERGIA, SGPS

IT – Information Technology

KPI – Key Performance Indicators

LPG - Liquefied Petroleum Gas

OFC – OrbitoFrontal Cortex

P&C SRL – Planning and control of the supply, refining and logistics unit.

REN - Rede Eléctrica Nacional, S.A

SRL – Supply, Refining and Logistics.

CHAPTER 1

Introduction

The dissertation was performed with the format of a project / business case of a specific company. For this case, it was selected an in-house project of the company GALP Energy, SGPS, further referred to as GALP Energy. This project focuses on improving the archive system of the investment projects further referred to as FIP (Folders of project investment).

This project, as explained in further chapters, is inserted into one of the many areas of GALP Energy, particularly in the supply, refining and logistics of the company, which will be referred as SRL.

The main challenge of the project consisted of finding and implementing a solution, within an ambitious period of time (6 Months), without increasing costs. This implies that we cannot obtain other means than those already existing within the company, including software, personnel and other assets.

According to these limitations, another problem emerged related with training and adherence of the personnel to the new solution. Some employees for instance have been presented as reluctant to changes, while others presented some specific lack of comfort to work with some of the available software.

In the end, a global solution that met the desired outcome presented would have to be perfect regardless of these limitations.

To achieve this objective, first there is a need to understand how the core business works, and how we can contribute to its improvement. Then an explanation on how the idea of a new approval workflow emerged is presented to complement the archive system of the investment projects in the SRL.

Before moving on, there is a need to enhance the fact that this work is not about manipulation. Rather, it is about nudging the stakeholders toward the solution, saving them from being affected by their own decision biases and heuristics that could lead them away from the desired outcome of the project.

Right now, the process to create a solution begins by summarizing what GALP energy is about as Oil Company, what it produces, and where the project inserts within it on the next chapters. The readers already familiar with GALP Energy, SGPS and the Oil Business might

go directly to the 4th Chapter related with the project to develop. For those who desire to know more then let's begin with an overview of how the oil business operates.

CHAPTER 2

Oil Business

The oil sector as a complex one should be understood in a broad manner, since oil is not tradable as well as final product obtained for consumption. The point of this topic is only to give you a global vision of how the oil business operates and to describe the value chain of the petroleum industry.

The value chain of the petroleum industry, displayed in the figure 1, can be segmented into five main activities: Exploration, Production, Transportation, Refining and Marketing. The exploration is an attempt to discover hydrocarbon reserves. The production is the process that applies to the exploitation phase, based on the extraction and marketing of hydrocarbons, which are then transported to refineries (transportation). The next step is the refining which is the process of transformation of oil into refined products that can be consumed later. Finally comes the marketing that is the marketing of final products obtained to the consumer.
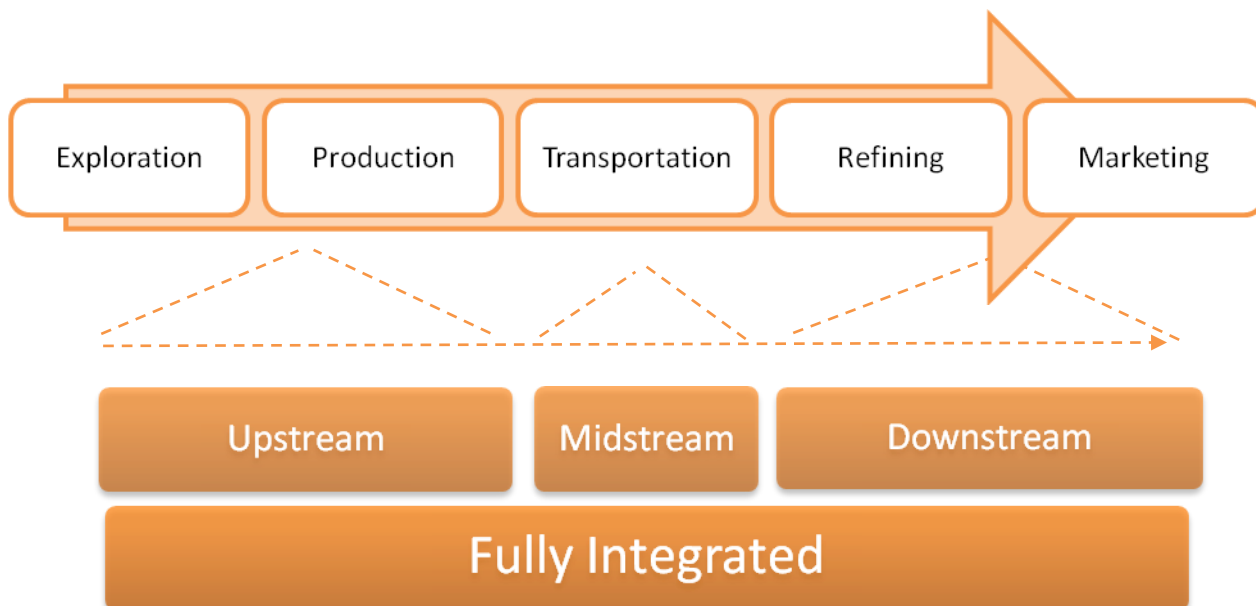
Figure 1: value chain of petroleum industry
Source: Galp Energy

In this sense there are three types of players in the oil:

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The upstream firms dedicated to the exploration & production phases, as in the case of several companies such as Tullow Oil, Dana Petroleum, among others. On the other hand there are **downstream firms**, focused on refining and distribution, as examples companies like Saras, Neste Oil, among others. **Fully integrated companies** are present throughout the value chain of the petroleum industry where there are companies such as Shell, BP, Total and on our case, **Galp Energy.** However Galp Energy is not only about oil, the company has others businesses as we will understand on the next chapter.

CHAPTER 3

Description of Galp Energy

The History and business segments:

Galp Energy is a unique company in a national (Portuguese) context. The company is currently an integrated multi-energy operator.

Galp Energy was formed on April 22, 1999 under the name of GALP - Oil and Gas de Portugal, SGPS, SA with the aim of exploring the business of oil and natural gas as a result of restructuring the energy sector in Portugal. Galp Energy grouped Petrogal, the only major refiner and distributor of oil products in Portugal, and Gas de Portugal, importer, carrier and distributor of natural gas in Portugal.

Galp Energy is an integrated energy operator, present in all stages of the value chain of oil, natural gas and with a growing presence in electricity generation. Its activity is developed on a global scale, through the presence in countries like Portugal, Spain, Brazil, Angola, Venezuela, Mozambique, Cape Verde, Guinea-Bissau, Swaziland, Gambia, Equatorial Guinea, Timor Leste and Uruguay.

The activity of Galp Energy, shown on the figure 2, is divided in three main business segments: Exploration & Production (E & P), Refining & Marketing (R & D) and Gas & Power (G & P).

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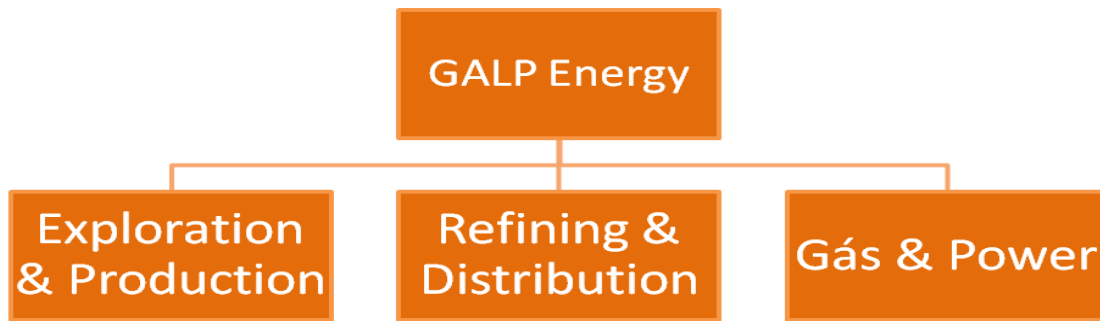
Figure 2: Business segments at Galp Energy
Source: Galp Energy

The in-house project to be presented on this Thesis will be developed on the Refining & Distribution business segment. Nevertheless an overview presentation of each business segments activities is showed below.

3.1.   Exploration & Production

The business unit of E & P is responsible for the activities of Galp Energy in the area of upstream oil industry, especially in prospecting, exploration, evaluation, development and production of oil and natural gas, currently with a portfolio of 46 projects from exploration & production.

Galp Energy has started these activities in Angola in 1982, with the field of Safueiro. Since then, others fields were added to its portfolio in that country through several projects, including the "block 14", with a high potential and the main source of current oil production of the company.

Besides the presence in Angola, Galp Energy has a large portfolio of projects in Brazil, which he joined in 1999, through participation in two.

In exploration activity, the company is also present in Mozambique, Equatorial Guinea, Venezuela, Uruguay, in East Timor and Portugal.

The company is strongly determined and focused on the development of exploration activities in Brazil, as presented on the figure 3, where the size of discoveries in the Santos Basin allowed Galp Energy to integrate the inner circle of companies with exploration programs that reached a great success rate and high impact.

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Figure 3: Geographic distribution of E&P
Source: Annual Report 2009 of Galp Energy

3.2. Refining & Distribution

The area Refining Galp Energy is responsible for ensuring coverage of the market of petroleum products, from selection and procurement of raw materials, refining of raw materials and the logistics of supplying the market.

3.2.1. Refining

With regard to refining units Galp Energy operates the only two domestic refineries, one in Sines with a processing capacity of 220,000 bbl and another at Porto/Matosinhos with a processing capacity of 90,000 bbl.[2]

The Sines´s Refinery:

The refinery of Sines began operations in 1979 and currently holds a distillation capacity of approximately 10.5 million tons / year, accounting for approximately 70% of national refining capacity. The refinery has a procedural setting oriented towards maximizing

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[2] Barrel of oil (bbl):

A unit volume measurement used for petroleum, based on the volume of one barrel, equal to 0.15891 m3 for a crude oil barrel at 60 degrees Fahrenheit (15.6ºC).

the production of petrol, having two units of vacuum distillation unit, catalytic conversion of heavy distillates, designated Fluydo Catalytic Cracking ("FCC"), one and two units of Visbreaker hydrodesulfurizing diesel. The strategic location of the refinery near the deep water port of Sines is a prerequisite for the high competitiveness of this plant. The refinery receives raw materials, particularly oil, from around the world, especially imports from the countries of the West African coast, such as Angola, Nigeria, Equatorial Guinea and Cameroon. The refinery has capacity to store 3 million m3, of which 1.5 million of crude oil and the remaining intermediate and end products such as gasoline, diesel, and bitumen, among others.

The refinery is connected through a pipeline 147 km to the largest park of storage of petroleum products in Portugal, the CLC, in Aveiras de Cima, where Galp holds 65% of the company.

The Porto / Matosinhos´s Refinery:

The refinery began operations in Porto in 1969 and currently holds a distillation capacity of 4.4 million tons / year. The configuration procedure, hydroskimming, favours the simultaneous production of fuels, lubricants, aromatics for petrochemical industry, industrial solvents and waxes. This industrial unit includes a fuel factory, a plant based oils, an aromatic plant and a blending plant for lubricants. The storage capacity is 1.986 million m3.

The actual ambitious investment project:

The company is developing the largest industrial project in its Portuguese refining activity. So the company is developing a bold plan for the conversion of Sines and Porto, budgeted at about 1.4 billion Euros.

This project aims to make the refining system more modern, safe, reliable and above all more suited to actual needs of the local market (Iberian Peninsula). The project plans to maximize diesel production, since demand for this product in the Iberian Peninsula is much higher than the supply capacity of the Iberian's refineries. Moreover, the conversion of the refineries will enable the replacement of light crude for heavy crude oil, taking advantage of the price differential between them, and increase the rate of refinery utilization through greater processing heavy crude oil refinery at Porto/Matosinhos. There is also a project, included in the conversion of refineries, which consists of increasing energy

efficiency, with the aim of reducing consumption & breaks, which constitute an important part of the operating costs of any refinery.

This ambitious plan for the conversion of domestic refineries will be completed in the last quarter of 2011.

The refineries produce:

• Gasoline;

• Diesel;

• LPG (liquefied petroleum gas);

• Fuel oil;

• NAFTA (used by the petrochemical industry to make polymers which are made of plastics, fibbers for fabrics and even chewing gum);

• Jet fuel (aviation fuel);

• Bitumen (asphalt and for insulation);

• Sulfur (for pharmaceuticals, agriculture and bleaching of wood pulp).

Figure 4: Galp Energy's Refinery in Sines
Source: Galp Energy

3.2.2. Logistics

The Iberian logistics network of Galp Energy comprises a wide range of parks storage, as presented in the figure 5, and access to marine terminals in Sines and Leixões.

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Galp Energy is the largest shareholder with a stake of 65% of CLC, a logistics company that owns the only Portuguese multiproduct pipeline in Portugal. The pipeline connects the refinery of Sines to the CLC Aveiras park and has 147 km long, capable of carrying four million tons of petroleum products in sequence. The park CLC has a total capacity of storage 250.000m3.

In Spain, Galp Energy has a 5% stake in CLH, the leading logistics company in the country. This participation provides access to 39 storage units (6.4 million m3 capacity) and 3.475 km of pipelines. Most storage facilities are connected to the network of pipelines and transports 25 million tons per year of petroleum products. The Iberian logistics network is supported by the storage terminal in Valencia, Spain, and several storage parks around the Portuguese territory.

The logistics system is completed by the concessions for exploitation of marine terminals in Sines and Leixões.
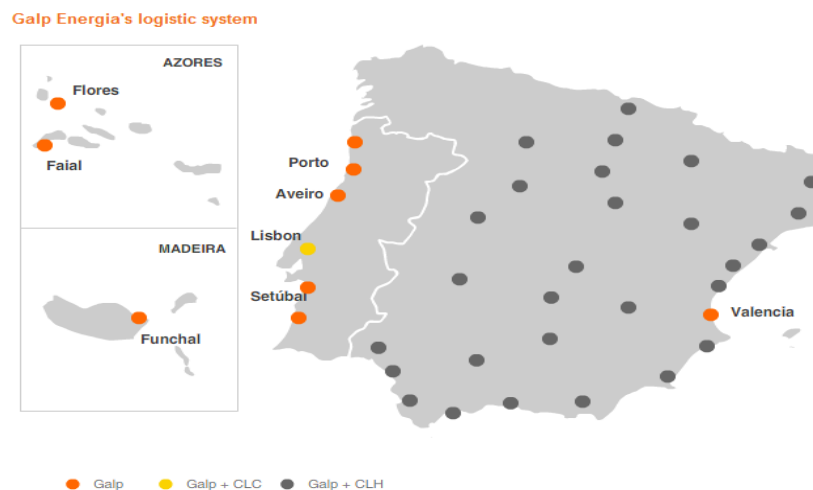
Figure 5: The Logistic terminal System
Source: Galp Energy

3.2.3. Oil Distribution

The oil distribution business includes the retail activities, companies and LPG. In this business segment the company operates in Portugal, Spain, Cabo Verde, Angola, Mozambique, Gambia, Swaziland and Guinea-Bissau.

Galp Energy has completed a major acquisition of distribution assets of Agip and Esso (about 620 stations, among other assets) in the Iberian Peninsula, in late 2008. With this acquisition the company completed an important step towards the complete integration of the business of refining and distribution and allowed a very significant increase in market share in Spain.

The segment of the retail business includes two main activities: (i) the sale of petroleum products at service stations (fuel business) and (ii) selling products in stores (non-fuel business). The retail network consists of 1500 service areas in the Iberian Peninsula, accounting for about 30% of sales to direct customers of the company. The retail network in the Iberian Peninsula sells about 3.6 million tones of petroleum products. The business segment consists of companies in the marketing of petroleum products to segments of transportation, aviation, industry, contractors, and marine lubricants.

International:

Galp Energy has 98 service areas in Africa, and is present in the marine, aviation, industry and LPG business segments.

In order to realize the strategy of expanding distribution business in Africa in 2008 the company acquired the distribution business of Shell in Mozambique, Swaziland and Gambia.

3.3. Gas & Power

3.3.1. Natural Gás

The main business segment activities of Natural Gas are: (i) natural gas supply, mostly through long-term contracts supplemented, occasionally, using the spot market, (ii) underground storage of natural gas, (iii) sale of natural gas to large industrial clients, the

companies producing electricity, natural gas distribution and (iv) sale to customers in the liberalized market.

In Portugal, the natural gas sector is composed of a set of activities regulated and liberalized.

The regasification of liquefied natural gas and transport gas at high pressure are outside the universe of activities of Galp Energy (REN activities). The import, storage, distribution in medium and low pressure and marketing are the company's activities.

3.3.2. Power

The segment of Power is the latest in the business portfolio of Galp Energy. The company is present in the electricity market through projects related to renewable energy, cogeneration, combined cycle plant to natural gas trading and electricity.

CHAPTER 4
The Project

After presenting a broad view of what Galp Energy is about, the following chapter will explain the project of this thesis, and which are the specific areas involved within the Refining business of the Refining & Distribution segment presented in the chapter 3.2.

4.1.   What is intended with the project?

Definition of the problem context, scenarios and critical factors:

The Department of Planning and Control of SRL (Supply, Refining and Logistics) of Galp Energy plans to reduce the space occupied by the investment project folders (Presented in the introduction as the FIP) and improve the search process of the files within the physical archives. The challenge presented by the Planning and Control of SRL began with the recognition of a lack of physical space to archive the FIPs and with the time wasted to found specific files. After a brief research and analyse the following problems were presented:

- During the last year, the project folders related with the refining investments have reached the maximum library, physical, capacity available, and therefore more

physical space was needed. However this situation would increase the costs which the company intends to avoid.

- The time that took each employee to find a specific file within a specific folder was considered too high, taking into account that each folders might contain around 16 files with approximately 90 pages on each investment project. Every year the company archives at least 200 investment projects in the SRL business unit alone.

- The approval and archival of the folders are closely linked. All the folders are physically sent for approval before being sent back for final archival with the approval signatures required. Therefore a change in the archive system would require a change in the approval logic of the projects which represents another challenge.

- The approval of the project depends on several degrees of projects that will be explained on the chapter 4.2.3. However the main problem worth pointing out is the fact that sometimes some folders lack sufficient or specific information to justify the investment. These folders are usually sent back to the managers of the project at the refineries or logistic for mending. This increase the time hubs needed for approval and the physical control of the folders even more difficult to manage.

- Stimulating a change in the behaviour of the employees to adopt a new archive system and approval of investment's projects with the technologies and software already existing in the company is considered challenging, and expensive, due to the time needed to be spent on training and corrections needed within the development of the process.

To summarize in Key point:

➢ The files grab too much space, accumulate dust and bring costs associated with their storage.

➢ The time it takes to search for a specific document is high.

➢ Transit time for documents submitted for approval is considered too high and too dependent on the physical delivery through the various hierarchical phases.

➢ There was a fear that the solution would not be financially attractive due to difficulty of implementation and high training costs (Mostly opportunity cost).

After presenting the broad idea of the problem, the following chapter (4.2) explain which areas; departments and business units are involved in the process.

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4.2. Description and identification of the specific areas involved in the Problem context:

This project is being developed in the segment of refining & distribution of GALP Energy, more specifically belonging to the SRL business unit with the following major activities:

- Supply of petroleum products to the Oil Distribution Unit;
- Buying and selling products to other operators in the Iberian Peninsula;
- Supply of crude Oil and raw materials, importation and exportation, transfer of products, including chartering of vessels;
- Refining Refineries in Sines and Porto;
- Iberian Logistics, including distribution of capillary Oil Distribution Unit;
- Marketing of chemicals.

The Business Unit operates through official channels and also by the transverse processes such as planning, follow-up projects and consists of seven areas presented in the figure 6:

- Chemical Supply and Trading
- Integrated Margin
- Logistics
- Refining
- Office of Engineering and Projects
- Planning and Control
- Shipping

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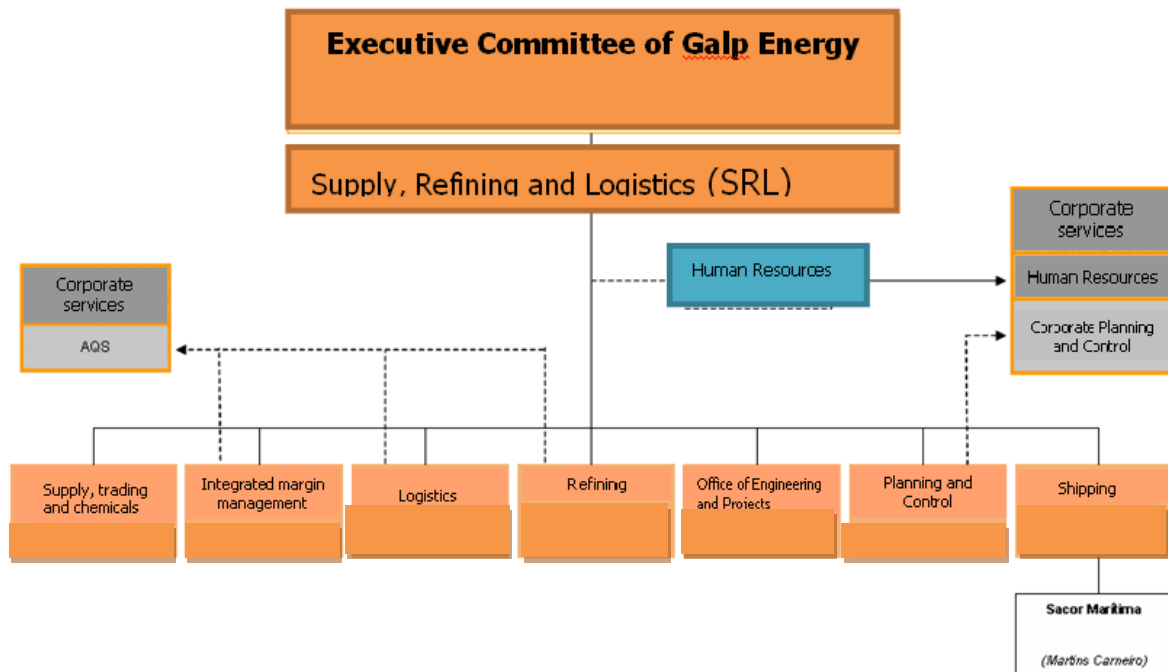
Figure 6: The Supply, Refining and Logistics Structure at Galp Energia in 2010
Source: Galp Energia Internal organogram 2007

The main areas involved in this project, are the Logistics, Refining, Planning and control and the Corporate Planning and control. A brief introduction on their mission and importance is presented below:

Planning and control of the SRL business Unit:

The project is been developed by the Planning and control of the SRL unit which has the main following structure (Figure 7) and activities:

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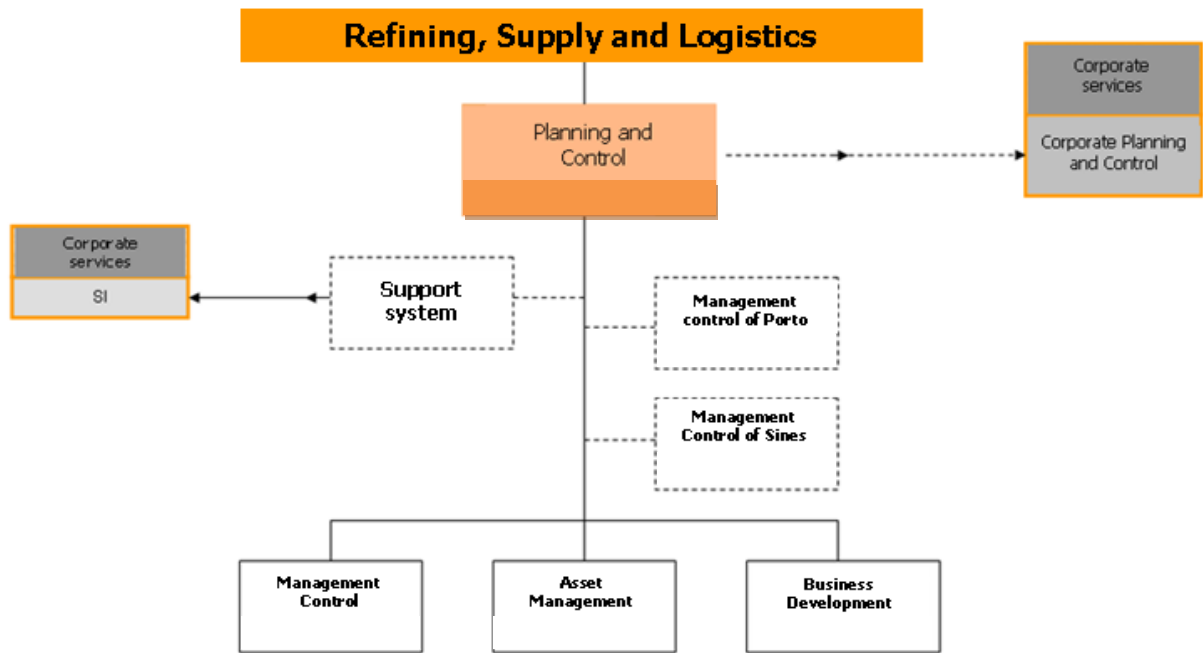
Figure 7: SRL Planning and Control (P&C SRL) Structure

- Lead the planning and management control of the Supply, Refining and Logistics Unit, challenging its improved performance, and boosting their development in accordance with its strategic objectives.[3]

The project is mainly developed by the **Asset Management** area**,** presented above in the figure 7, which ensures the preparation of opinions for the investment projects (including validation and / or developing their profitability studies for projects of value creation) and Proposed Disposals, promoting the process of closure of projects to ensure a high standard accuracy and performance in the use of the company's capital.

It is in this area that the physical library is located, and managed.

The Refining area:

Another area involved in this project is the **Refining Area** which includes the refineries (Sines and Porto) already presented in the chapter 2.

Their Mission consist in ensuring the reception and storage of crude oil and other raw materials, manufacturing and then shipping finished products and other derivatives of

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[3] Galp Energia Internal organogram 2007

crude oil, optimizing the profitability of both refining facilities in terms of operating costs or income.[4] Therefore, when a project seems according to their mission and the refining investment standards, they send an e-mail with the FIP to the Planning and control SRL department (Further referred to as P&C SRL), presented earlier, to issue an opinion favorable or unfavorable according to the budget initially approved. The e-mail sent is printed in the P&C of the SRL department and with the opinion attached to the FIP (Folders of investment project). If the project presented to the refining area doesn't meet their agreement, it can be rejected and returned to the refinery in cause. The projects usually come from the refinery of Porto/Matosinhos and the refinery of Sines.

The logistic department:

On the same logic as from the refining area, the logistic department is also included in the development of this project.

Their mission consists in ensuring coordination and optimization of integrated logistics of the Galp Energy Company to ensure the support of the competitive position of fuels and maximize the value of logistics assets.[5]

Inside the logistics department there is an optimization and development area responsible to ensure adequate monitoring and logistics support to the activities of Galp Energy, conducting studies with a view to optimization, tracking and monitoring of competition opportunities, evaluating the performance of business and investments, and proposing measures to streamline and increase efficiency.

Directly related with this project, they elaborate and develop investment projects sending proposals to the P&C SRL as part of the investment project folders to be treated like any other investment projects sent by the refining department. That means it will be printed with the opinion of the P&C SRL department and sent for approval according to their level of approval, to be archive, once approved, in its proper physical folder.

The Corporate Planning and Control department (CPC):

When the investments are superior to 1 Million of Euros[6] then this area is involved in the approval process, and therefore in this project.

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[4] Galp Energia Internal organogram 2007

[5] Galp Energia Internal organogram 2007

[6] Due to the need to keep some confidentiality on that information, this value is pretended.

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This department not presented as part of the SRL business unit, has the mission to challenge the performance of Business Units and Corporate Services to ensure its alignment with the strategic objectives of GALP Energy.[7]

Major Duties:

- Coordinate the areas of Business Planning and Control of Galp Energy Group, including Corporate Services, managing the budget process and business plan, and the fulfillment of objectives;

- Propose Key performance indicators, further referred to as KPI, for the Group, to participate in the plan performance of Business Units and Corporate to ensure the implementation of specific programs of value creation;

- Monitoring the process of evaluation and approval of investments and advice the Executive Board the approval of those within its competence, controlling the evolution and outcomes of relevant investments;

- Ensure the activities of management control and reporting, in order to consider possible deviations in the results and identify, in collaboration with the areas involved, corrective actions and programs for improvement;

- Ensure information flows for the preparation of periodic reports of the Company.

Among the set of duties presented, the one pointed out in bold is the most important in this project process.

4.3.   How the process works and the problems founds:

After presenting each department involved in this project, there is a need to explain the approval steps and liaison between departments. This liaison is divided on 2 phases according to the research elaborated, and they include the main moments of the approval process and archival of the folder of investment projects (FIP) as presented on the figure 8 and 10 of the chapter 4.3.1 and 4.3.2 respectively. The first phase will portray the moments that prior to the final approval of the FIP, known as the elaboration of the opinion by the P&C SRL.

The second phase is related with the collection of the final signatures for final approval on the FIP explained on the chapter 4.3.2.

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[7] Galp Energia Internal organogram 2007

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4.3.1.   1st phase on the approval of the FIP: The Opinion Elaboration
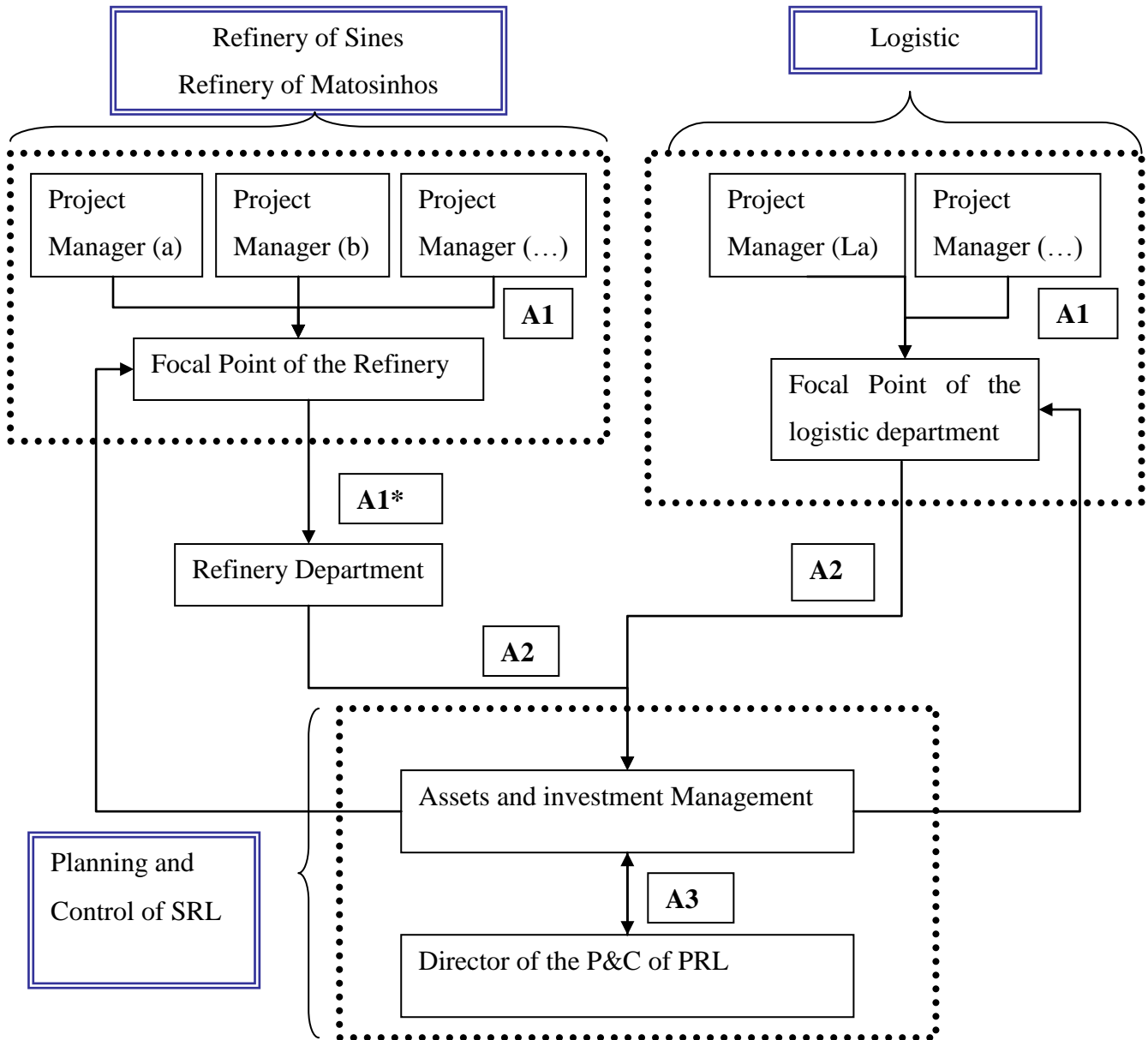
Figure 8: The 1st phase on the FIP approval structure - The Opinion Elaboration

From the figure 8 presented above, there is three departments already introduced on the chapter 4.2, the Refineries and the Refinery department as the Refining department, the logistics and the planning and control of the SRL.

Within this scheme are represented the four most important moments in the approval process that will be explained below. The moments are A1, A1*, A2 and A3. Each of these will be analyzed in turn.

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Here is the process summary on this moment and the impacts caused:

- Project's managers elaborate by computer the folder of the investment project (Known as the FIP), with random names for the files in the computer. This process is time consuming.

Problem Detected for the Planning and control of the SRL business unit:

- The fact that the files are named randomly in the computer makes it difficult to quickly access the information intended.

- Sometimes the information comes incomplete and, as a consequence, the files are sent back for correction extending the time to approve the project until the remaining information arrives.

Explanation of the last two points:

This moment is the preparation of the investment project's folder by the project manager. So this moment represents the starting point of the process. All this work is done by computer, and at this point, our first difficulty arises - The Name of the files. Although this problem may not seem relevant, it takes time for the readers to find the intend information. For instance the files named like: "Fic_Inv_turbogerador 1/05/XY.Xls" or "Turb_ger_dor.doc" does not allow a clear deduction on the content. As we will see later on, in the theoretical framework (Chapter 5), on the choice architecture part, we are dealing with a design's mistake to delay the search process with names that can be deceiving for other content than intended. Another problem emerges on this moment, related with the lack of relevant information needed for the approval of the project, essentially due to ignorance or distraction of the project manager which could happen to anyone. This difficulty is related with the fact that each folder might have more than 90 pages of information's therefore it is possible that sometimes some information is missing or forgotten.

The moment A1*:

- This moment is similar to the one relate with the P&C SRL, specifically in the part that they need to realize a control on the content of the documents and check if the project meets the refinery department's mission. This moment is distinguish, because it is the first moment where an approval is essential for the final approval of the

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project. Their approval must be sent by e-mail otherwise the project should not be consider for opinion in the P&C of the SRL. This moment only exist for project related with the refineries.

Time usually spent on this moment:

- Around 1 to 2 Weeks including the task analysis and approval.

The Moment A2:

- The documents of the project are sent by e-mail to the Planning and Control of SRL business unit. So far everything is done by computer. The documents arrive through e-mail at the Assets and investment Management sub-area of the P&C SRL where this project is generally managed.

  The documents are checked, and the following documents must be presented:

  - **Contract Project Management** (PDF document)

  - **Report of Evaluation / Justification / Approval** (Word Document)

  - **Profitability Analysis** (excel or word Document) when the project is created to increase economical or financial value of the company.

  - **Sheet Project / Investment** (Excel) it is a document that resumes the content of the project and collects, in the end, the signatures of approvals.

  - Technical Studies. (Document without a specific format)

  - Market Studies. (Document without a specific format)

  - Environmental Impact Studies. (Document without a specific format)

  - Others documents that would justify the implementation of the project proposed for approval, (PDF, Word and Excel format essentially) like for instance, previous studies and consultations prior to the market (if they exist and which do not entail commitments), the Assessment Report / Justification / Approval (Profitability Analysis including, when applicable), Minutes of meetings and advice from other areas (if any) and extracts from the legislation (if deemed relevant).

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Once the documents checked, the area (P&C SRL) must ensure the preparation of an opinions[8] on the investment project (including validation and / or developing their profitability studies for projects of value creation) to guarantee a high standard accuracy and performance in the use of the capital to be applied.

Summary:

- After the documents checked, the area emits an opinion on the project for approval.

- Once the opinion created, the area **prints** all of the documents that constitute the FIP[9] with the opinion to be approved by the respective level of competence that will be presented on the next chapter (4.3.2).

The main objective of the project starts here, where the need to improve the performance of approvals and archival of the FIP is crucial for the success of this project.

The question here was:

"*Since every document arrive by computer, why not create a folder in the shared server and put all of the documents there?*" That situation would solve the archive problem. Nevertheless a physical signature is still required for the approval, and searching for the folder in the server is still a complicate task. Therefore "putting" the folders in our servers still seems the appropriate solution however it continues to require further studies on which software to use and how to organize the folders. For instance:

10709	01-05-2011 17:40	Pasta de ficheiros
Proj 10809	01-05-2011 17:40	Pasta de ficheiros
Proj Desisobut	01-05-2011 17:40	Pasta de ficheiros
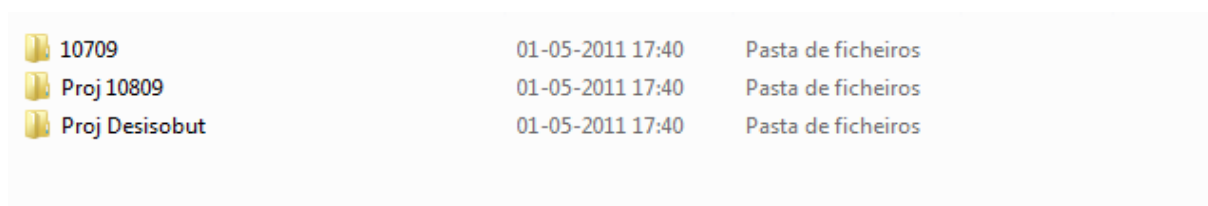
Figure 9: Example of the files arrangement.

Does that kind of arrangement presented on the figure 9, for the folders seem to work? No, because the specific files needed are still difficult to find and even with the best database and Hyperlinks, between the files and the database, this arrangement makes it difficult to

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[8] (Technical document with the analysis and summary of the key points to approve or reject an investment)

[9] Folder of project investment

manage this archive. That is one of the main problems. We will discuss this problem deeper when discussing the choice architecture tools.

Now assuming that we found the "perfect" software to manage and support our archive, then emerges the promoting questions related with the strategy on how to promote your Information Technology (IT) solution in order to stimulate acceptance, adhesion and preferred use among other solutions.

So the problems that arose up to this point were:

- Costs related with the printing of the FIP.
- How to archive the FIP in order to make the documents easy to find reducing the costs associated with the archive of the files.

- How to obtain acceptance from users of the IT solution to be implemented.

The moment A3:

- This is the final moment of my first phase of analysis on how the approval and archival process of the FIP works. After the elaboration of the opinion on the project by the sub area Assets and investment Management of the P&C SRL, the entire FIP, including the opinion, printed out and sent for approval by the P&C of SRL Director on the content of the FIP and opinion.

Most of the problems are within the last moment (A2). Nevertheless there are some other problems specific of this moment (A3):

- When the Director doesn't agree with a certain point, or verifies the need to modify or update any document, the process returns to the Assets and investment Management area to change a specific point on the opinion or to send the process back to the manager of the project for a particular change. The problems with this situation related with the time and the costs associated are:

    – Printing the new document(s)

    – Demanding changes to the project manager

    – The accumulation of projects in paper going back and forth for changes on the desk, increasing the risk of losing or forgetting important projects during the time they are pendent.

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– The poor capacity, due to a dependence on Human capacity to update constantly the database on the situation of a project, to clearly audit the time and day that the project was on one person or another. This audit is necessary to justify to the other departments the existence of delays in the approval, or simply to explain the point of situation in the approval workflow of the project.

Time usually spent on the moment A2 and A3 together:

- Around 7 days including the analysis of the task and the elaboration of the opinion.

4.2.3. 2nd phase on the approval of the FIP − Collecting the signatures of approval:
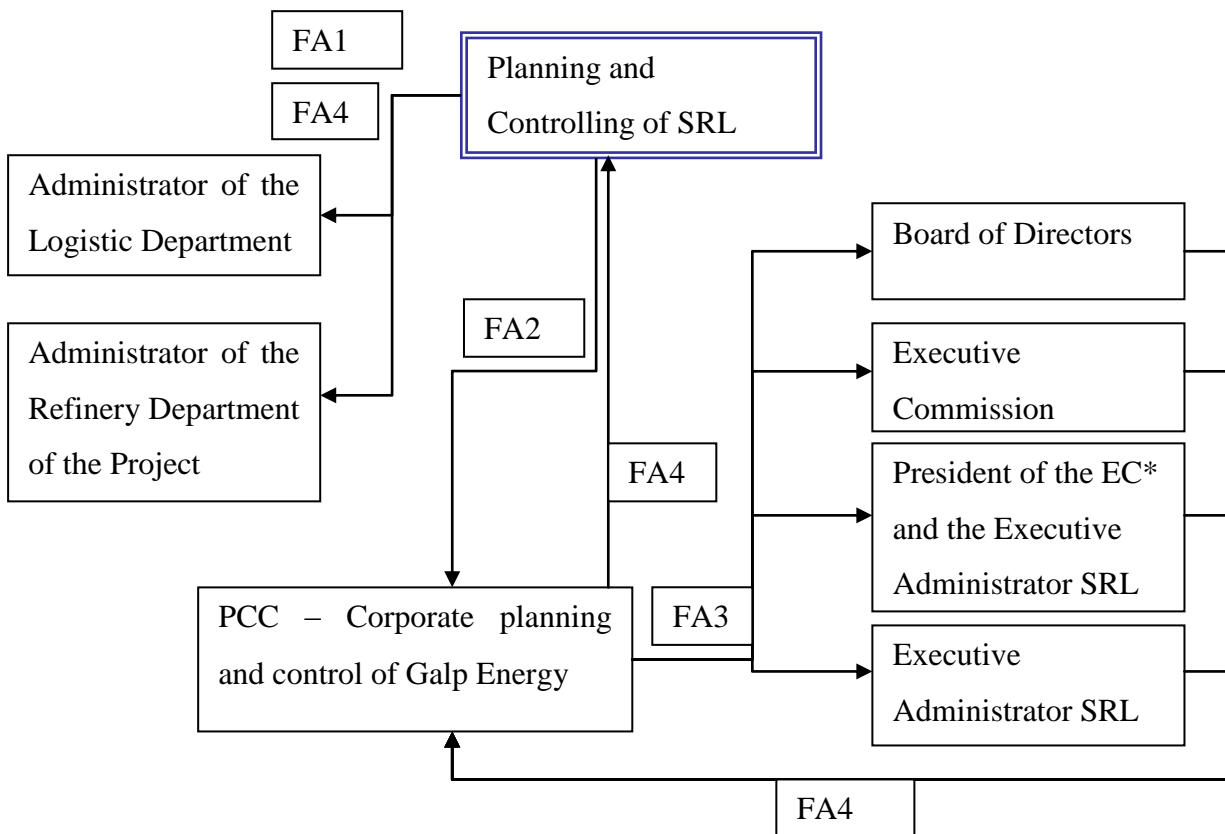
*Executive committee.

Figure 10: 2nd phase on the approval of the FIP Structure – Collecting the signatures of approval.

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The 2nd phase is presented with the above scheme (figure 10), on the final steps to approve a project. This graph is closely related with the first one (Figure 8) representing the continuation of the approval workflow of the FIP[10]. On the first phase the figure 8 presented the process of reception of a FIP in the P&C SRL department, for the elaboration of an opinion, to begin this 2nd phase (figure 10) that represents the collecting of the final approval signature of the investment projects according to their competence levels for approval explained below.

Levels of competence to approve the projects:

Due to the sensibility and need of confidentiality of this information, the values presented in Euros are not the real ones, nevertheless the idea behind it, is.

There are six levels of competence to approve the projects. The levels are:

- Level 6 - Projects above 50 Million Euros.
    - To be approved by the Board of Directors
- Level 5 - Projects above 3 Million Euros and below 50 Million Euros.
    - To be approved by the Executive Commission
- Level 4 - Projects between 1 and 3 Million Euros Included.
    - To be approved by the President of the Executive Commission and the executive administrator of the SRL area.
- Level 3 - Projects between 1 Million included and 700 Thousands Euros.
    - To be approved by the refining administrator.
- Level 2 - Projects between 400 Thousands Euros and 700 Thousands Euros included.
    - To be approved by the administrator of the department of the project
- Level 1 - Projects below 400 thousands Euros included.
    - To be approved by the responsible of the area of the project.

Until the level number 3, there must be a document known as the "Parecer" (Translated, it means Opinion) of the P&C of SRL that will give an opinion favorable or unfavorable of the projects. On the level 4 and above, this document must be elaborated from

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[10] Folder of investment project

the Corporate P&C of the Company. If the project receives an unfavorable opinion usually they are not approved. Independently of the level of competence for approval of each project, they must pass by the P&C department of the SRL to evaluate the content and verify the existence of all necessary documents that must constitutes the FIP, before proceeding to the elaboration of the opinion.

Returning to the main subject of the analysis of phase 2 in the approval process, we detected four important moments (FA1, FA2, FA3 and FA4). These moments represents the following:

The Moment FA1:

This moment represents the devolution of the FIP with the opinion of the P&C SRL, signed by his Director, to receive the final signature of approval for the project by the administrator of the department. This moment is only applicable for projects whose investment is below 1M€, according to the level of competence for approval.

 The Moment FA2:

For the projects above 1M€, the FIP with the opinion of the P&C SRL, signed by his Director, is sent to the CPC for them to elaborate their opinion and sign their approval.

Problems Detected for the P&C SRL:

- There is less control to track the status of the project. (Where is it? Is it approved?) There is always a need to send an e-mail or contact them by phone for feedback about the status of the project. (Time consuming)

- The CPC is physically on the other tower, (Physical distance) which causes delays in the delivery of the FIP through internal mail. Why not by e-mail? Because the original signature must always be present on the original FIP.

The Moment FA3:

From this point, once the opinion realized and the signature of the CPC director given, the FIP is sent to his respective level of competence for the approval of the project.

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Problems Detected for the P&C SRL:

- There is less control to track the status of the project. (Where is it? Is it approved?) There is always a need to send an e-mail or contact them by phone for feedback about the status of the project. (same problem pointed in the moment FA2)

The Moment FA4:

After the final approval signed, the entire FIP is sent back, through the CPC, after to the P&C SRL and to finish to their respective area.

Problems Detected for the P&C SRL:

- The time that it takes to receive the information that the project is approved, due to a lot of intermediaries.

Summary and commentary on the situations presented on this chapter 4:

Most of the problems presented here are related with the difficult task of organizing an archive, reducing the time spent due to bureaucracies in the approval of a document, or in this case, investment's projects.

The solution for these problems for most people seems quite easy to obtain. "*Be more organized and quicker on the approval."* Some of them would even suggest, according to their level of knowledge, a specific software or method to reorganize the archive system and even the approval workflow of the projects but that's also a problem. Not the suggestion itself, but the fact that we suggest solutions that we know regardless of the fact that someone might not feel comfortable with them. Finding the best software to use, or a method to reduce the time spent to approve a project is not an easy task, and requires training and acceptance from its users. Then another challenge appear, which consists in guaranteeing that the project doesn´t go off track due to biases and heuristics that will be explain further in more detail. Therefore the next chapter (5) will be dedicated to understand how we become "choice architects" that nudges people toward their optimal point and protects them from bad choices caused by decision biases and heuristics leading this project toward a better archival and tracking of the FIPs.

CHAPTER 5

The Research (Theoretical Framework)

5.1. Being a Choice Architect

What we have been discussing so far, is an introduction on how we should take this project strategically in order to succeed. We analyzed the company, the process, and all the departments involved. The following topics shall be related with a problem that is common in projects management which is concerned with "decision biases" that might lead a project to failure. For instance Humans are known to chronically underestimate the time it takes them to finish projects (the planning fallacy). They have a tendency to stick with the status quo even when it's not in their interest (inertia). They routinely assess risk based on the most recent, most salient, most accessible examples of those risks (availability bias). They estimate probabilities based on the degree to which the event is deemed as representative of the category (representativeness). These examples are only a small part of a large set of decision biases that should be taken into attention when accessing the risks of failure of a project.[11]

Understanding the way the stakeholders related with the result of this project decide, is one of the main concerns and therefore part of this theoretical framework to prevent mistakes during the planning and execution of this work.

Designing the way the stakeholders will feel and most importantly decide and act is not a simple task. It demands us to understand the environment that surround, and affects them in order to guarantee that the project will not deviate from its desired outcome. Some readers perhaps believe that all decisions are made according to some economists, consciously and rationally with the capacity to store a huge amount of information exercising an extraordinary power of will and therefore the project should not fail when well designed. However according to H.Thaler, Cass R. Sunsein, decision Makers do not make choices in a vacuum. They make them in an environment where many features, noticed and unnoticed, can influence their decisions, always assuming as a good rule of thumb that everything matters to

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[11] "Educational seduction" Philip C. Abrami, Les Leventhal and Raymond P.Perry. Review of educational Research Fall 1982 Vol 52, nº3 Pp 446-464. The Dr Fox Lecture.

influence people´s behaviour[12]. To better explain this position H.Thaler and Cass R. Sunsein in their book Nudge 2008, gave an example of a door with a large wood handle which instinctively impulse the students that were leaving the class to pull in order to get out. However the door was meant to be push. As explained in the book, the students were faced with two competing instincts. One was self-conscious thought process by which humans use logic and reasoning while the other was automatic, rapid and intuitive. When confronted with a large wood handle, the immediate instinct was to pull, and therefore a clear action from the automatic system stimulated by the signal presented by the door. When signal and desire are in opposition, performance suffers and people blunder. In conclusion to illustrate how the door should be to increase the performance reducing the errors associated with the opening of the door to the wrong side is presented below (Figure 11):

Figure 11: The two systems in conflict. The door Example.[13]

To avoid the signal and desire to struggle in opposition, H.Thaler and Cass R. Sunsein (2008) suggestion consisted in creating and managing the environment in which people will make decisions to reduce the errors and mistaken stimulus that would conflict with one's desired actions. Therefore if the desired action of the employees is to reduce the time spent finding files on an ineffective archive system then we need to design a way that would reduce such failure in the environment that surrounds that task. For that reason, the person who creates and manages that environment is, in their terminology, a ***choice architect.*** In their book "Nudge" 2008 they add, "*A choice architect has the responsibility for organizing the context in which people make decisions.*"[14]

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[12] It can also be found on their paper: "CHOICE ARCHITECTURE" from, Richard H. Thaler, Cass R. Sunstein, John P. Balz (2007) http://ssrn.com/abstract=1583509-04/04/2010

[13] http://bondg.com/pull-and-push-door-concept-makes-coming-and-going-a-lot-easier/ -30/04/2011

[14] "CHOICE ARCHITECTURE" from, Richard H. Thaler, Cass R. Sunstein, John P. Balz (2007) http://ssrn.com/abstract=1583509-04/04/2010 2nd page last Paragraph

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Choice architecture helps nudge people to make better decisions without forcing certain outcomes upon anyone. The Tools they highlight to succeed in this task are: **defaults, expecting error, understanding mappings, giving feedback, structuring complex choices, and creating incentives**. Here is the interpretation of each one of them using some examples from their book[15]:

- Defaults: Padding the Path of least Resistance:

For reasons of laziness, fear, and distraction, many people will take whatever option requires the least effort, or the path of least resistance. These Behavioural tendencies toward doing nothing will be reinforced if the default option comes with some implicit or explicit suggestion that it represents the normal or even the recommend course of action. A good example is for instance machines, such as chain saws and lawn mowers, are designed with "dead man switches", so that once a user lets go of the handle, the machine's blades stop. Another example, are the Big Kid slides at playgrounds which are built with the first step about two feet off the ground to keep smaller kids from getting on and possibly hurting themselves.[16]

- Expect error:

A well-designed system expects its users to error and is as forgiving as possible. An example of this kind of error is for instance, what psychologists call as a "post completion error" (Byrne and Bovair 1997). The idea is that once the main task is finished, people tend to forget things relating to previous steps. The example used includes leaving the ATM cards in the machine after withdrawing cash, or leaving the original in the copying machine after making copies. The ATM no longer allows this error because the card is returned before you can withdraw your money along with other sound warnings.[17] Strategy suggested by Don A. Norman[18] is called the "forcing Function" which in order to accomplish a desire task; another step must first be taken.

- Give Feedback:

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[15] "CHOICE ARCHITECTURE" from, Richard H. Thaler, Cass R. Sunstein, John P. Balz (2007) http://ssrn.com/abstract=1583509-04/04/2010 2nd page last Paragraph
[16] "CHOICE ARCHITECTURE" from, Richard H. Thaler, Cass R. Sunstein, John P. Balz (2007) http://ssrn.com/abstract=1583509-04/04/2010 2nd page last Paragraph
[17] "CHOICE ARCHITECTURE" from, Richard H. Thaler, Cass R. Sunstein, John P. Balz (2007) http://ssrn.com/abstract=1583509-04/04/2010 2nd page last Paragraph
[18] DONALD A. NORMAN, The Psychology of Everyday things, Basic Books, 1988

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The best way to help Humans improve their performance is to provide feedback. Well-designed systems tell people when they are doing well and when they are making mistakes. An example of this can be the digital cameras which generally provide better feedback to their users than film cameras. After each shot the photographer can see a (small) Version of the image just captured. [19]

- Understanding "Mappings": from choice to welfare.

A good system of choice architecture helps people improve their ability to map and hence to select options that will make them better off. One way to do this is to make the information about various options more comprehensible, by transforming numerical information into units that translate more readily into actual use. Daniel Watkins presented on his paper the following example related with Ice Cream Shops: "*The variety of flavours is often mind-boggling. How can anyone know whether flavour A is better than flavour B? To help solve this problem, many ice cream shops allow customers to sample flavours before purchase to better "map" the relationship between their choice of flavour and their welfare after that choice. An informed ice cream purchaser is a happy one*".[20]

- Structure complex choices:

When facing a small number of well-understood alternatives, the tendency is to examine all the attributes of all the alternatives and then make trade-offs when necessary. But when the choices set get large, alternatives strategies must be employed, causing serious problems. One strategy to use according to the Book Nudge, is what Amos Tversky (1972) called "Elimination by aspects" Someone using this strategy first decides what aspect is most important, establishes a cut-off level, and then eliminates all alternatives that do not meet this standard.

- Incentives

The incentives consist on putting the right incentives on the right people. This comes from the fact that in some domains people may want the salience of gains and losses treated asymmetrically. For instance, no one would want to go to a health club that charged its users

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[19] "CHOICE ARCHITECTURE" from, Richard H. Thaler, Cass R. Sunstein, John P. Balz (2007) http://ssrn.com/abstract=1583509-04/04/2010 2nd page last Paragraph
[20] "A NUDGE TO MEDIATE: HOW ADJUSTMENTS IN CHOICE ARCHITECTURE CAN LEAD TO BETTER DISPUTE RESOLUTION DECISIONS" Daniel Watkins, 2010, page 18, 2nd Paragraph.

http://ssrn.com/abstract=1472470

on a "per steps" basis on the Stairmaster. However, many Stairmaster users enjoy watching the calories burned meter while they work out. [21]

After understanding these "tools", the next step for any policymaker is to determine what irrational biases and/or cognitive errors cause's people to deviate from the optimal desired outcome of the project through mistaken choices. Finally to conclude, an important aspect in the choice architecture design, consists of guaranteeing that the policymaker alters the choices in which the stakeholders encounters the options in order to make the optimal choice easy to select in light of the Human's biases and errors. The fact that the Humans retain their ability to freely choose mitigates the risks that the policymaker's own irrational biases and cognitive errors will trap the stakeholders in a suboptimal system.

An example of the application of the choice architecture was given recently (2010) by Daniel Watkins. He presented, in his paper[22], that various studies demonstrated that parties who resolve certain disputes via mediation are frequently better off financially and emotionally when compared to their adjudicating counterparts. With his paper he suggests that parties in conflict suffer from irrational biases and cognitive errors, when deciding between mediation and adjudication making suboptimal decisions not because of suboptimal information, but because of irrational biases and cognitive errors. Watkins theory says that if you replace adjudication as the default dispute resolution method, parties will choose to mediate more often. The important part is that disputing parties retain the choice between mediation and adjudication. Only the context in which they make that choice changes.

In conclusion, a proper choice architecture makes good decisions easier to make. A good policymaker first asks what a particular person or group of persons wants but is unable to obtain, and then designs a way to provide the best closest solution without limiting their choices. This idea will be tested and used as part of the solution for this project.

Nevertheless there is still a need to research and better understand how the stakeholders make decisions and act. The tools presented are useless if there isn't a clear understanding on the biases, heuristics and others human errors associated with the thinking

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[21] "CHOICE ARCHITECTURE" from, Richard H. Thaler, Cass R. Sunstein, John P. Balz (2007) http://ssrn.com/abstract=1583509-04/04/2010 2nd page last Paragraph

[22] "A NUDGE TO MEDIATE: HOW ADJUSTMENTS IN CHOICE ARCHITECTURE CAN LEAD TO BETTER DISPUTE RESOLUTION DECISIONS" Daniel Watkins, 2010,

http://ssrn.com/abstract=1472470

process that could affect the development of the project. The next topic shall be concerned with understanding those aspects.

5.2. How do we make decisions? And which are the biases and heuristics that could affect the success of this project?

Just to remember some key points of the last chapter:

➢ We saw on the lasts topic that a reason for deviation (There is others) of the desired outcomes is caused by incorrect decisions or decisions biases and heuristics.

➢ To reduce the effects of those decisions, it was important to understand that many features, noticed and unnoticed, can influence the decisions and therefore a good design of the context in which those decisions were made is essential.

➢ The "Solution" (to be tested) presented is called Choice Architecture and itself with 6 tools to help nudge the stakeholders toward the optimal point. (Desired Outcome)

➢ The tools Highlighted were: options by default, expecting error, understanding mappings, giving feedback, structuring complex choices, and creating incentives.

➢ Finally we conclude that proper choice architecture makes good decisions easier to make. A good policymaker first asks what a particular person or group of persons wants but is unable to obtain, and then designs a way to provide the best closest solution <u>without limiting their choices</u>.

Related with this topic:

To complete the purpose of the choice architecture, a better understanding on the decision making process would be essential to complement the design of the environment (Physically and mentally).

How do we make decisions? Neurological aspects - Introduction

The Modern science has mapped specific zones in the human brain. This is the era of the Neuroscience, which is the ability to understand the nervous system of the Human brain and has been recently a base of interest from several disciplines, including computer science, statistics, physics, philosophy, mathematics, medicine[23] and an answer to questions related

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[23] http://en.wikipedia.org/wiki/Neuroscience - checked in 06/08/2010

with the decision making process, important aspect in management and for this project. Looking back at the chapter 5.1, we saw in the example presented of the wood handle door, that we have two competing instincts. Therefore the research shall begin on this topic.

The Two Systems of Daniel Kahneman:

As the Nobel prize-winning psychologist Daniel Kahneman explains, there are two types of human thought processes: System 1 and System 2. **System 1** processes are "*fast, automatic, effortless, associative, implicit (not available to introspection), and often emotionally charged; they are also governed by habit and are therefore difficult to control or modify.*" **System 2** processes are "*slower, serial, effortful, more likely to be consciously monitored and deliberately controlled; they are also relatively flexible and potentially rule governed.*" [24]

As rational adults, we assume that most of our judgments derive from System 2; we perceive ourselves as reasoned creatures who "think things through." In fact, however, almost all judgments begin as System 1 intuition; we have gut reactions to just about everything. System 2 deliberations challenge and override our initial System 1 decisions in a surprisingly limited number of those cases. Instead, we are more likely to use System 2 cognitive processes to justify the intuitive judgments we generate using the more emotional leaps of System 1. Our brains excel at intuitions, first impressions, and quick judgments, but struggle to make more complex decisions. This situation is related with the fact that "human cognitive capacities are limited" so "problem solving is hard work.", therefore we can add that Humans have a restricted working memory, making it difficult for us to process multiple pieces of data. To make thoughtful evaluations, the brain needs time to recall diverse bits of data, compare them, group pieces of information into larger chunks of partial judgments, and ultimately yield a reasoned response.[25]

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http://www.merriam-webster.com/medlineplus/neuroscience - checked in 06/08/2010

Article from "Sabado" magazine" The Brain. The new discovery of science", nº 313 29 April to 5 May of 2010 pag 48-58.

[24] "MAPS OF BOUNDED RATIONALITY: A PERSPECTIVE ON INTUITIVE JUDGMENT AND CHOICE" Prize Lecture, December 8, 2002 by DANIEL KAHNEMAN. Page 450 last paragraph

[25] From the Book "Nudge" Richard H. Thaler and Cass R. Sunstein 2008 of the editor "Academia do Livro" page 35 to 41 complemented with the "MAPS OF BOUNDED RATIONALITY: A PERSPECTIVE ON

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As an example[26] of the effects of the system 1 and system 2 thinking, when confronted with this challenge:

- One Ball and a Racket costs together 1,1€

- Knowing that the Racket Costs more 1€ than the ball.

How much does the Ball cost?

Take time to answer.

Probably your quick answer to what seems an easy challenge will be 0,1€ , which would be wrong. Let me explain the reasoning justifying why it is wrong:

B (Ball) + R (Racket) = 1.1€. If R = B +1 then B must be equal to 0.05€.

Therefore B+R=1.1€ then B + (B+1) = 1.1€ to conclude, 0.05 + (0.05 +1) = 1.1€. Therefore the correct answer would be 0.05€.

This situation is common, I performed several informal test to confirm this heuristic known as the mental calculation, and obtained from the audience in my 2 presentations given (one in the secondary school in Massamá, Portugal and another one to political aspirants in Sousel, Portugal) a "100%"[27] failure from the participants to answer correctly to this challenge.

Therefore as we can conclude, our emotions (Responsible according to António Damásio[28] for the existence of intuition or System 1) have an important weight on the way we take our decisions on a daily basis. That is why the next topic is related in a brief study of our emotional system to better understand this topic.

The Importance of our Emotions:

INTUITIVE JUDGMENT AND CHOICE" Prize Lecture, December 8, 2002 by DANIEL KAHNEMAN. Page 450 last paragraph and page 451.

[26] Example taken from the Book "Nudge" Richard H. Thaler and Cass R. Sunstein 2008 of the editor "Academia do Livro" page 40

[27] I assumed a 100% result since nobody given me a correct answer or discussed the results given by others; however this was an informal, not a scientifically designed experiment.

[28] From the book "The feelings of what happens", Antonio Damásio, 1999, 15ª edition of October 2004, page 77 to 81

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Emotions comes from a *primitive part of the brain called the limbic System* (some author also includes the Hipotálamus), *which lies below the cerebral cortex*[29].

Possibly the most important area controlling our emotions is the amygdale, which mediates our fears, anxiety and anger. The limbic system has very direct connections with the senses. This leads to the very rapid and unconscious reactions which we call gut reactions[30], instincts or system 1 as presented before from Kahneman.

According to António Damásio, he discovered though a patient named Elliot, in 1982, who had lost in an surgical operation, most of his OrbitoFrontal Cortex (OFC) responsible for the integration of visceral emotions in the process of decision making in the Pre-Frontal Cortex (Where the information is processed in our brain), that he was unable to make any simple decision, like where to park is car, or where to eat, task that would demand 10 minutes to reach a decision, for Elliot it would take hours and sometimes was unable to reach a decision[31]. The conclusions are that without emotional response, a brain cannot efficiently decide. So far we understand that emotions are essential in the decision making process, however how do we stimulate or motivate a behavior of focus and interest toward a specific idea or project to implement?

The predictions of Dopamine. Fluctuations in our favour:

The Discovery of the Dopamine was made in 1954, as an accidental discovery made by James Olds and Peter Milner, Neuroscientists of Mc Grill University. Since then, much research has been done. In a pioneer one of Wolfram Schultz of the Cambridge University, he discovered that the process of the decision making, initiate with the fluctuation of Dopamine released from the Nucleus Accumbens. With the experiments done with monkeys, he realized how the process of expectation, and prevision, affects the decision making process. The discovery of errors in any prevision would increase the concentration of the animals to analyze their error and adapt the way they think to better react in the future to avoid repeating

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[29] From the book "bases Neurologique des comportement", Michel Habib, March 2003Page 173 to 202.

[30] http://www.newscientist.com/movie/brain-interactive – 4/04/2010

[31] From the Book "How we decide", Jonah Lehrr, 2009, page 19 to 45. The example of the Patient is present in Page 32 and on the book "The feelings of what happens", Antonio Damásio, 1999, 15ª edition of October 2004

the same mistakes.[32]Through those experiments, it was found that the Cortex interior cingulated (CAC) was full of dopamine neurons and that the thalamus directs the conscious attention on the incoming facts, helping the memorization, and helping to learn with the errors, which without it, we would repeat the same mistakes even if it destroyed our life like, for instance, burning ourselves with a candle several time or walking through a dangerous street twice after been attack at the first time, knowing that there is another street to our destination. Therefore, the learning process begins with emotional leaps initiated by pleasant outbreaks of dopamine in our brain, increasing the concentration, to solve errors made in any expectation or prevision. The strategy to enhance learning and concentration in the procedures to be adopted in the project are consequently linked with the management of expectations.

So far we realize the importance of the emotions to take decisions and the way it is related with the manner we focus our interest into a specific situation or problem. However how does the memory work?

Memory:

There are several types of memory. Our prefrontal Lobes deal with the information we need immediately – called working memory. This is how we retain a phone number for long enough to dial, or the early parts of a sentence so we can understand the whole when it is finished. Memories about things we did, places we went and information we collected along the way are created and stored in the hippocampus, a curved structure below the cerebral hemispheres. Longer term memories and factual information is gradually shifted around the brain, lodging in the temporal lobes or frontal lobes. Memories of how to do things are stored in the cerebrum. If you notice the location of the memories cells in the picture (Figure 12) you shall notice that they are mostly locate near the limbic system related to emotions. [33]

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[32] From the Book "How we decide", Jonah Lehrr, 2009, page 45 to 73.

[33] http://www.newscientist.com/movie/brain-interactive -04/04/2010 and From the book "bases Neurologique des comportement", Michel Habib, March 2003Pages 173 to 202 and 222 to 239.

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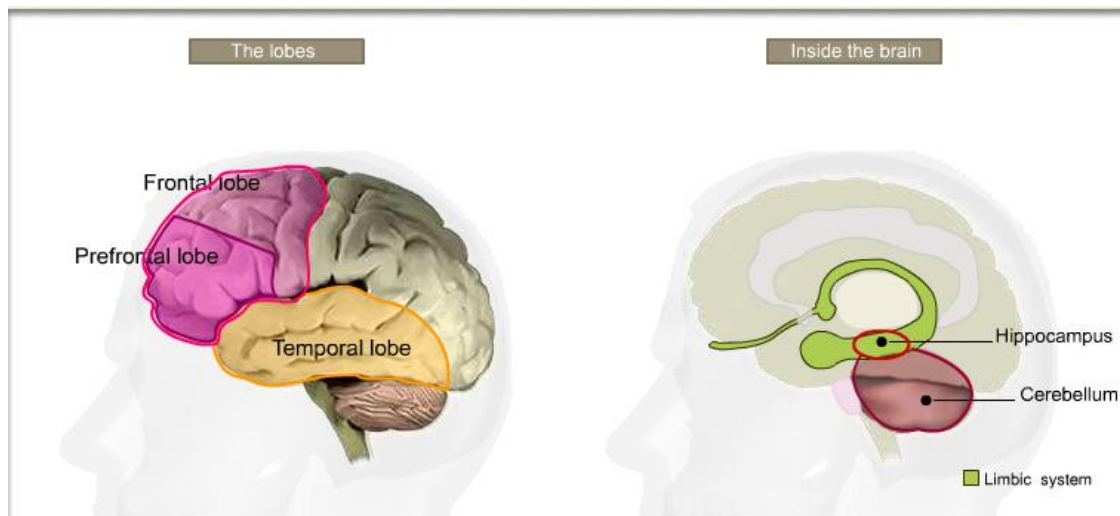
Figure 12: The Memory and its relation with the Limbic System. [31]

That is why it is easier to memorize things which you are stimulated emotionally with. So we can conclude that emotionally we can release pleasant substance of dopamine which increases our attention and consequently increases the memorization of the facts. The several stages of memorization are represented below (Figure 13):

Figure 13: Memory Multi-Store Model[34].

Understanding this process is important for our project, there is a need to map, what is relevant to be on the long term memory, like processes or the ability to use the new IT "tools".

However, sometimes, our emotions can deceive us according to Jonah Lehrer (2009)[35] as we will see.

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[34] http://en.wikipedia.org/wiki/File:Multistore_model.png Checked in 28/8/2010

[35] From the Book "How we decide", Jonah Lehrr, 2009, page 73 to 109.

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Deceived by our "gut feeling":

The Neuroscientist Baba Shiv (Stanford University) gave energy drinks to two different groups. Both groups received the same drink, the only difference was in the fact that one group received the information that is drink was on a wholesale discount. The group with the energy drink on discount concluded that their drink was less effective than the drink of the other group which wasn't. These sensations are known as the **Placebo effect** studied by the Neuroscientist Tor Wager from the Colombia University. Tor Wager gave small electric chocks in his patients arm, and then give them cream to ease their pain. Everybody believed that the cream was actually working because the doctor told them that it would, however the cream was nothing in special. It was just cream! [36] From that experiment, the conclusion taken is the fact that the Pre-Frontal Cortex can sometimes inhibit certain part of our emotional brain like the Ínsula (related with the feeling of pain or loss) for instance. So the way we analyze and process the information can affect the way we feel about it. This thinking process realized by the pre-frontal cortex, which according to the interpretation made, is related whit the system 2 of Kahneman presented at the beginning of this theoretical framework, can switch the way you feel when facing an unknown situation or outcome. Therefore to manage, any feeling of procedure loss in the development of the project, it is essential to stimulate the system 2 of Kahneman related with the rational thinking process of the brain.

To complement this topic, an understanding of the way the brain plans and creates rational decision is presented below.

The use of reason, the Pre-frontal Lobe - Planning, ideas and decisions:

*"*When we weigh things up and make a decision, or when we have to test our several possible outcomes, the brain's prefrontal lobe is necessary. This brain area is more highly developed than in any other animal. This is where the most complex calculations and cognition occur, and therefore very important for intelligent thought. They also have a working memory, which allows us to keep several ideas *"*in mind*"* at the same time as discussed before in the memory topic."[37] This area of the brain is, as said before, what represents the system 2 of Kahneman already described before and therefore essential on the

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[36] From the Book "How we decide", Jonah Lehrr, 2009, page 73 to 109.

[37] http://www.newscientist.com/movie/brain-interactive -04/04/2010

development of this project as a project's manager. However here is an example from an article about the Chileans miners stuck underground to explains its importance:

"How did 33 men survive 17 days trapped in the mine?

*"It's really not a miracle," said Laurence Gonzales, author of "Deep Survival: Who Lives, Who Dies and Why" (W. W. Norton & Company, 2003). "The reason those guys stayed alive so long as **they were extremely disciplined**."*

*Once communication was established with the ground ..., the miners reportedly **explained they had rationed their supplies**, **limiting themselves** to two spoons of tuna, sips of milk, a bite of crackers and a morsel of peaches, stretching supplies intended to last two days over more than two weeks with leftovers.*

*"That is a starvation diet," Gonzales said in a telephone interview. "What these guys were doing, they were just keeping their level of nutrition just above starvation, I am sure **they all lost a lot of weight**."*

*Humans can last for weeks without food, but "food stress as they call it is tremendously debilitating," he said. "**Your whole body cries out for the things you need**, amino acids, fat, carbohydrates ... you can't think, you can't work."*[38]

On this piece of article, the words highlighted in bold, emphasize the action of the pre-frontal cortex, giving discipline to their attitudes, rationing supplies, limiting themselves even if their bodies cried out for more food. That situation reinforce what was presented before, the Pre-Frontal Cortex can sometimes inhibits certain part of our emotional brain and therefore physical needs. The article continues:

*"Organization and purposeful action are key to surviving in a prolonged, life-threatening situation such as this, **as is social connection**, he said. "If you have something to get back to, you are more likely to get back to it," Gonzales said. People also do better if they can help others, he added. "*

We will discuss this subject further on another topic related with the **social effects** on our decisions and actions, nevertheless related to this topic, as an example of social interactions and its liaison with the prefrontal lobe; we must add that our ability to interact socially with others is controlled by the prefrontal lobes. They are the barrier of our complex

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[38] http://www.mnn.com/earth-matters/wilderness-resources/stories/chile-mine-collapse-facts-about-the-amazing-survival-stor.- 07/08/2010

social emotions, controlling traits such as empathy, guilt, trust and behavioural control – which keep us from doing inappropriate things. Some researchers believe that criminal or psychopathic tendencies can stem from damage here. This analysis complement the fact that at night when we are tired from the day, the prefrontal lobe becomes weaker, resisting less to our instincts and our emotions like anger for instance. [39] For this project, these conclusions made it clear the need to manage the fact that at the end of the day for instance the persons involved in the development of the project will have less resistance to their emotions and therefore fail to think clearly in tasks that demand clear concentration. In the end of the day, it would be wiser to leave task associated with their habits and emotionally pleasant, associated with the system 1 of Kahneman, linked with emotions that demand less rational answers. Therefore, any meeting that requires full attention and rational discussion should be presented in preference in the morning when everyone is mentally "fresh".

Project managers can be "compared" metaphorically on the psychological aspect with the miners presented in the article above (With all the due respect to their difficulties which is incomparable). They have to "extract" information, "dig" solutions, and present results expected from the mine (project) they are exploring. However sometimes projects fails and collapses on the project manager, who needs to keep a mental discipline just like in this story, to stimulate others who are stuck with him, to hold and get out of there with the best solution possible. On both cases, one organ was and is vital to "survive" and get out of there with success - The pre-frontal lobe. With it, we analyse our situation, control our emotion as far as we can, and help our emotions to resist. However can we control our moral and cultural habits? Even if it makes sense can we act against those habits? The following topic is oriented to give a brief answer on this subject.

The Moral and cultural thinking:

The Moral mind or cultural thinking is very important for what is coming on this study. It is responsible for the resistance to any action without justifying or knowing how to justify why we don't act according to a certain situation. Example: If someone is asked, why he doesn't eat his own dog, or why he doesn't clean his bathroom with the flag of his country or favourite football club, the question is challenging his Moral brain cells allocated in the

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[39] http://www.newscientist.com/movie/brain-interactive 04/04/2010 and From the Book "How we decide", Jonah Lehrr, 2009, page 109 to 147.

emotional part of it. Can he justify why he doesn't do it? Normally he can't, but the interesting part of it, is that he will try even if deep inside he believe that what he says makes no sense. These are the Emotions in which we define ourselves.[40] In the project development, it is relevant to understand that everyone has its own cultural habits. Therefore the solution must adapt to the global cultural habits of the people involved in the process. For instance, changing their working schedule will conflict with their cultural working habits, enhancing discontentment, and therefore creating emotional barriers to the project development. Adaptation and tolerance to culture, local moral and values is crucial in this project. In conclusion, culture is defined as the totality of socially transmitted behavior patterns, arts, beliefs, institutions, and all other products of human work and thought[41], which is the same that saying that culture is the sculpture of a society. Therefore, since culture is a product of the society, it seems evident that we are influence by social behaviors. The next topic is related with a small study on its effects.

Society as a strong stimulus. "Following the herd":

"The lesson is very clear. If the "choice architects" want to change behavior, and whether to do so by encouraging, they can inform people about what others are doing. Sometimes the practices of others are surprising, as the people will get greatly influenced when they know them."[42]

The social influence is a powerful stimulus, as for instance, in Jonestown, that influence was so strong that an entire population committed suicide due to the social Belief[43]. For the management of this project the social effect on individuals will be applied in the design to obtain responses from the persons involved to reach the desired state. Nevertheless, before moving further, the main idea behind this stimulus is that we are influenced to do what others do and perceive or believe in what others perceive or believe. This is not a rigid rule and doesn't apply every time, but it represent a real increase in the probability that we might

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[40] From the Book "How we decide", Jonah Lehrr, 2009, page 181 to 209.

[41] http://www.answers.com/topic/culture#ixzz1NlVdYTD5 – 29/05/2011

[42] from the Book "Nudge" Richard H. Thaler and Cass R. Sunstein 2008 of the editor "Academia do Livro" page 99 2nd paragraph

[43] Layton, Deborah, Seductive Poison: A Jonestown Survivor's story of life and death in the People´s temple, New York, anchor, 1999

change our behavior or the way we think according to several social aspects, like the authority influence for instance, the projector effect (The act to believe that others persons look more at us about the way we present ourselves that they really usually do) or others aspects that will not be covered on this theoretical framework to keep it simple and straight to the point of his scope.

Therefore, and before concluding this topic, to reinforce the importance that it has been proved that we are influence by others, as an example, imagine a class where one student gives a wrong answer, and another one agrees with him. You might feel, assuming you were in that class as a student, even if your answer is actually correct, to think again and again trying to understand if the mistake is yours or theirs. Until you defend your opinion there is an increase probability that you believe in the wrong answer, and like most student do, you remain in silence waiting for an answer to avoid been looked as "dumb" by the colleagues and the professor. In the 50ths, Solomon Asch conducted a series of experiments on this field, and realized that in fact, when a group of persons was asked to answer individually a series of questions without the influence of others, they rarely made mistakes, however, when others given an previous wrong answer before the answer of the subject present in the same room, he made one third more mistake.[44] In the end we just want to be accepted socially by others as part of the society (Or at least recognized by it…).

Basic conclusion to retain for this project on the way the brain functions:

It is possible to concluded that we are oriented to react according to our emotions (system 1 of Kahneman), trying to mode and control these sensations and needs with reasoning (system 2 of Kahneman) and therefore we are not fully rational as we would like to believe but nudge to decide and react mostly due to our system 1. To conclude, this project should be directed to design the way the stakeholders will feel and decide on the solutions to be presented, preventing heuristics and biases that could affect the project's success.

For instance, we can´t successfully decide without feeling what is correct, and we cannot take action without carefully controlling and planning those feelings in the process. Everything is important and must be used in harmony, with the right amount and careful planning.

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[44] From the Book "Nudge" Richard H. Thaler and Cass R. Sunstein 2008 of the editor "Academia do Livro" pages 85 to 90

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Therefore to prevent the actions of heuristic and decisions biases, the next topic, presents a small list of some heuristics (Mental Shortcuts) and biases that could affect the decision making process leading the project away from its desired outcome.

Some perceptions, Heuristics and Biases:

Our perception on how the things works can affect the way we decide and react toward a change in our life or the way we work. Due to the extended list[45] of heuristics (mental shortcuts) and mental biases, this research is limited to only some of them which can be considered significant for the development of this work.

Biases and Heuristics that might affect the project:

- **Anchoring[46]**: the tendency to rely too heavily, or "anchor," on one trait or piece of information when making decisions.
- **Availability heuristic[47]**: a biased prediction, due to the tendency to focus on the most salient and emotionally charged outcome
- **Authority bias[48]**: the tendency to value an ambiguous stimulus (e.g., an art performance) according to the opinion of someone who is seen as an authority on the topic.
- **Endowment effect[49]**: the tendency for people to value something more as soon as they own it.
- **Hyperbolic discounting[50]**: the tendency for people to have a stronger preference for more immediate payoffs relative to later payoffs.
- **Gambler's fallacy[51]**: the tendency to assume that individual random events are influenced by previous random events— "the coin has a memory"

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[45] This list can be found in http://en.wikipedia.org/wiki/List_of_cognitive_biases - 07/08/2010

[46] "Judgment under Uncertainty: Heuristics and Biases", Amos Tversky and Daniel Kahneman in Science 27 September 1974, Vol. 185 no. 4157 pp. 1124-1131.

[47] "Judgment under Uncertainty: Heuristics and Biases", Amos Tversky and Daniel Kahneman in Science 27 September 1974, Vol. 185 no. 4157 pp. 1124-1131.

[48] Book "Nudge" Richard H. Thaler and Cass R. Sunstein 2008 of the editor "Academia do Livro"

[49] Kahneman, Knetsch & Thaler 1991, Journal of economic perspective.

[50] Hardman, David (2009), Judgment and decision making: psychological perspectives, Wiley-Blackwell

[51] Book "How we decide", Jonah Lehrer, Lua de Papel´s Editor, 1st Edition January 2010

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- **Overconfidence effect**[52]: the tendency to overestimate one's own abilities
- **Information bias**[53]: the tendency to seek information even when it cannot affect action
- **Illusion of transparency**[54]: people overestimate others' ability to know them, and they also overestimate their ability to know others.
- **In-group bias**[55]: preferential treatment people give to whom they perceive to be members of their own groups.
- **Framing effect**[56]: drawing different conclusions from the same information, depending on how that information is presented.
- **Loss aversion**[57]: the tendency for people to strongly prefer avoiding losses over acquiring gains. "the disutility of giving up an object is greater than the utility associated with acquiring it"
- **Outcome bias**[58]: the tendency to judge a decision by its eventual outcome instead of based on the quality of the decision at the time it was made.
- **Planning fallacy**[59]: the tendency to underestimate task-completion times.
- **Selective perception**[60]: the tendency for expectations to affect perception.
- **Status quo bias**[61]: the tendency for people to like things to stay relatively the same.
- **Reactance**[62]: the urge to do the opposite of what someone wants you to do out of a need to resist a perceived attempt to constrain your freedom of choice.

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[52] Hoffrage, Ulrich (2004), "Overconfidence", in Rüdiger Pohl, Cognitive Illusions: a handbook on fallacies and biases in thinking, judgement and memory, Psychology Press, ISBN 978-1-84169-351-4

[53] Book "How we decide", Jonah Lehrer, Lua de Papel´s Editor, 1st Edition January 2010

[54] T Gilovich, K Savitsky, VH Medvec, 1998. "The illusion of transparency: Biased assessments of others' ability to read one's emotional states." Journal of Personality and Social Psychology.

[55] Book "Nudge" Richard H. Thaler and Cass R. Sunstein 2008 of the editor "Academia do Livro"

[56] "Rational Choice and the Framing of Decisions", A.Tversky, D.Kahneman, Journal of Business, 1986, vol.59, no.4, pt.2.

[57] Kahneman, Knetsch & Thaler 1991, Journal of economic perspective.

[58] Baron J. & Hershey J.C. (1988). Outcome bias in decision evaluation. Journal of Personality and Social Psychology. Vol 54(4) Apr, 569-579

[59] Kahneman, Daniel; Tversky, Amos (1979). "Intuitive prediction: biases and corrective procedures". TIMS Studies in Management Science 12: 313–327.

[60] Book "Propaganda e Promoção – Uma perspective da comunicação integrada de Marketing." George E.Belch, Michael A.Belch, 7th edition of McGraw-Hill Interamericana Editora, Ltda. Chapter 4 Pg 102 -134.

[61] Kahneman, Knetsch & Thaler 1991, Journal of economic perspective.

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These biases will be presented, treated and analyzed during the development of a solution for this project.

The question so far, consists in knowing how to design a series of stimulation to enhance behaviors toward the optimal point desired for this process, reducing the risks, biases and heuristics presented. Before concluding this point related with Biases and Heuristics in the Decisions making process, it is relevant to say that all of the presented Biases and Heuristics were checked according to their reference on the site, to assure the quality of this content.

5.3. Questions that result from the theoretical framework:

The importance of the theories presented for the project:

Before moving further on the project let's reviews what was presented above and what we need to take into account that justifies the importance of the theories presented:

Theories Presented

1) Choice architecture - Designing behaviours toward the project

2) How does the brain Work and how does it influence the way we make decisions
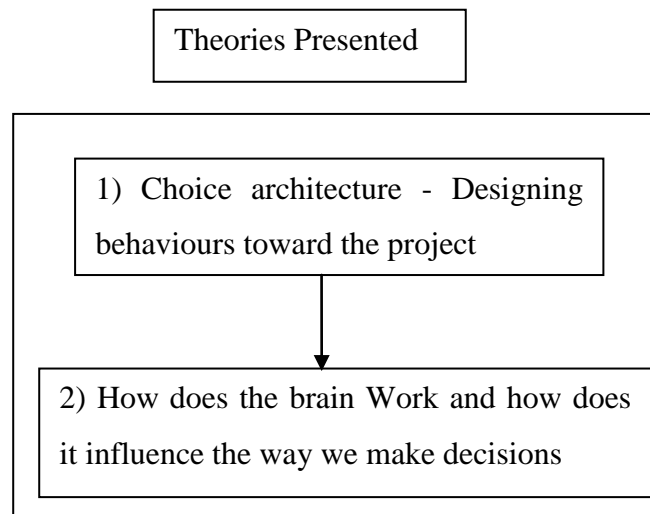
Figure 14: Conceptual Board on the theories presented

As you can see from the conceptual board (Figure 14), the theoretical framework is divided in 2 parts:

1. The project will test the Choice architecture approach as a possible solution to complement the project's planning, implementation, stimulating actions and behaviours from all of the stakeholders involved, through the management of the environment in which the project insert.

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[62] Brehm, J. W. (1966). A theory of psychological reactance. Academic Press.

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2. To better understand how to help the stakeholders to react, it is important to explore the way they usually think when making decisions in order to avoid mistakes and to enhance reactions.

After justifying the presence, importance and use of the theories presented, the subsequently step consists in questioning them, to draw new conclusions, refute or confirm them, applying their ideas in the implementation of the project and suggesting in the conclusion new ones if necessary.

The liaison between the theories presented:

In the figure 15 below, there is a conceptual board summarizing the liaisons between the main theories presented. Below the conceptual board (Figure 15) is a set of questions to be questioned during the implementation of the project.

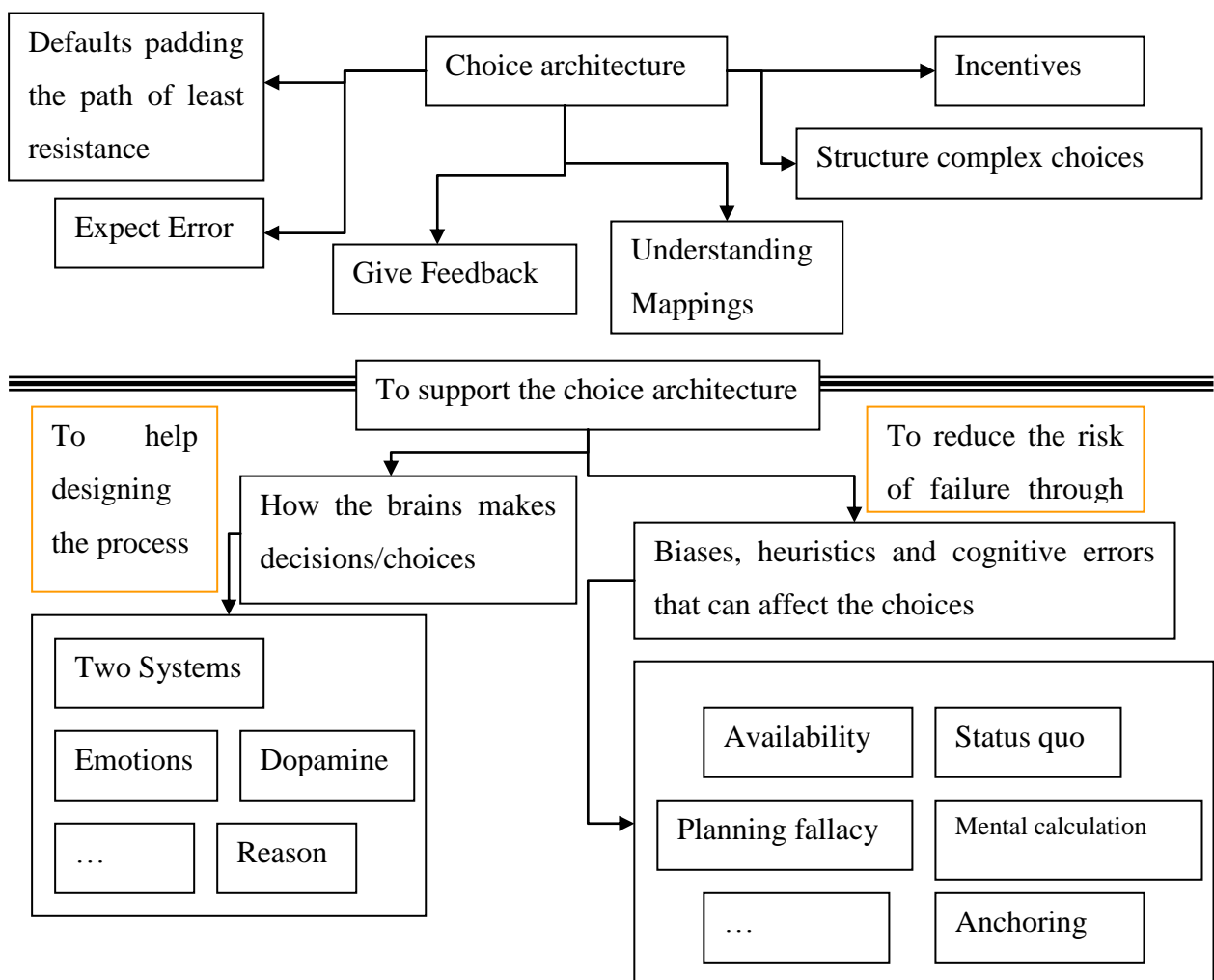The logical thinking obtained from the theoretical framework:

Figure 15: The Theoretical logical thinking obtained

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The figure 15, illustrates, the paths to take into analyze during the preparation of the project. The challenge consists in adapting these points with the planning and implementation process of the project. During the execution of this work, the objective will consist to respond with the experience gained from this project to the following questions that result from the Theoretical Framework:

- Which is the desired stated or factor of success of the project?
- Can the choice architecture be applied to this project? Do all the principles presented apply?
- How can we design the way our brain makes decisions (According to what we discuss), in favour of the implementation of the project?
- Does the choice architecture helps reduce the effects of biases, heuristics and cognitive errors that can affect the choices toward deviation from the desired state of the project?
- Which are the main biases and cognitive error that could affect the development of this project and others?

These are the main questions to answer during the planning and execution of the project.

The main objective in the end is to be able to enhance the critical thinking toward the data presented and develop other solutions, line of thinking and good questions that should result in a positive contribution to increase the quality in the way we practice project management using the choice architecture approach.

5.4. Methods and techniques for collecting and analyzing data

Because there is no study so far adapted to the situation and specific need of this project in the company, the next step consists to carry out a preliminary study. The aim of this preliminary study, as the name implies, is to prepare a questionnaire / interview of the final version to be officially unveiled, to get as much input with the highest quality of information possible, obtained, from individuals involved in the process to be implemented. [63]

The main process of research on the way to implement the project is the following:

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[63] Book "Investigação por Questionário", Manuela Magalhaes Hill e Andrew Hill, Edições Silabo,lda 2nd Edition Lisbon 2005.

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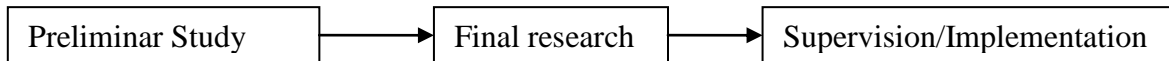| Preliminar Study | → | Final research | → | Supervision/Implementation |

Figure 16: The 3 main phases of research

The end purpose is to provide a final product that is best suited of the needs of each element involved, identifying and reducing the weight of individual weaknesses, concerns, and needs enhancing the skills acquired in order to promote the progression of the project. In short, the 1st step is to identify the parts available (resources), and what are the key success factors for the project to be assumed as a success. Therefore the plan for the preliminary research is to obtain the following information:
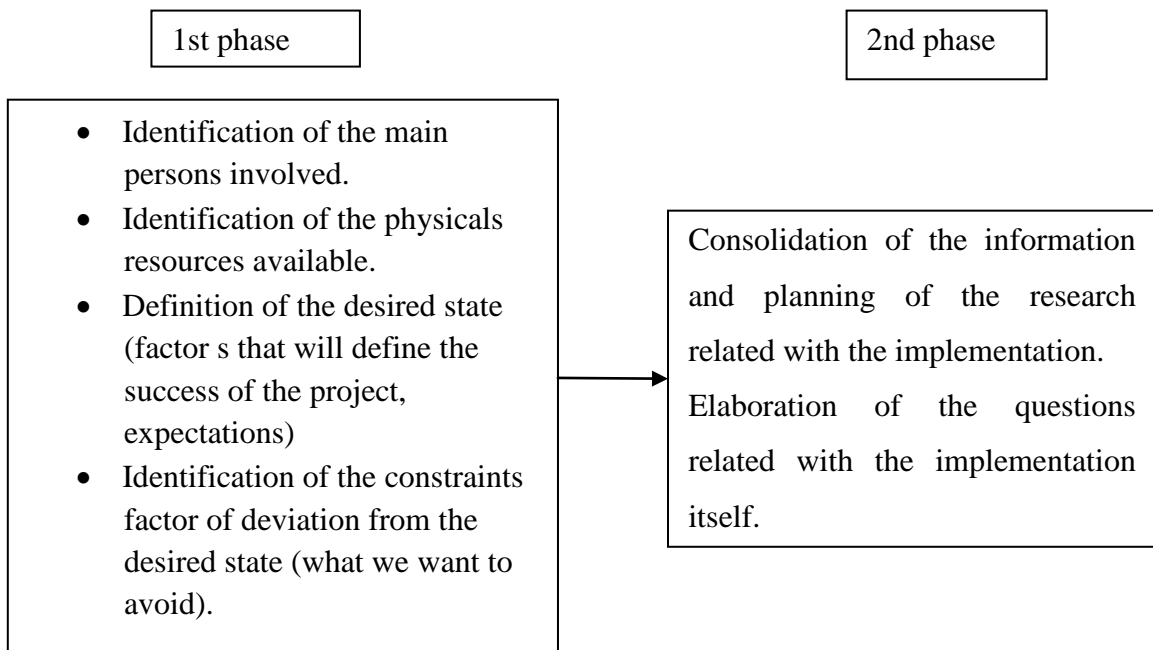
| 1st phase | 2nd phase |

| • Identification of the main persons involved.
• Identification of the physicals resources available.
• Definition of the desired state (factor s that will define the success of the project, expectations)
• Identification of the constraints factor of deviation from the desired state (what we want to avoid). | → | Consolidation of the information and planning of the research related with the implementation. Elaboration of the questions related with the implementation itself. |

Figure 17: The 2 Research Phases to apply on the preliminary study

Due to the short number of people involved in the process we will give priority to an investigation being conducted by interview or as it appears in the book of Management of Michael Franzese (2009), a "Face-to-Face".[64]

In the first phase, the intent is to identify the variables that will define the final product. The main goal is to guarantee that the main goal is clearly define, that all the resources that might participate in the implementation process of the project are identified and

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[64] Book, "I´ll Make you an Offer you can´t Refuse" Michael Franzese – 1st Edition March 2010

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available, and finally to obtain an idea of the constraints that might lead the project away from it is goal.

Finally, the last major objective of the preliminary study is to verify the relevance, clarity and understanding of the questions that will follow during the planning of the project before they are presented.[65]

The research related with the implementation of the project:

After the preparation of the questionnaire and interviews in an individual model basis, the next step consists in proceeding during the project implementation of several new interviews and group discussions to identify critical points in the collective feedback and seek improvements or simple changes really needed to be implemented during its development thus seeking to avoid excessive redesign of the process increasing their run time unnecessarily.[66]

The advantage, also predicted, with the group discussion to be presented during the process, will be the solidification of the concepts presented in the discussion as a way to provide training to the less-informed elements in the project. It would be a training session where every doubts and problems identified shall be discussed, explained and resolved collectively. This activity (group discussion) will meet one the tools from being a choice architect, specifically the need to **give feedback** as referred on page 29.

5.5. Data collected and planning of the project's solution (Questions and Results of the Preliminary study and final research):

What is the desired state?

The first challenge consisted in knowing what the expectations around the project were.

This research was done by interview according to two reasons:

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[65] Book "Investigação por Questionário", Manuela Magalhaes Hill e Andrew Hill, Edições Silabo,lda 2nd Edition Lisbon 2005.

[66] Book "Investigação por Questionário", Manuela Magalhaes Hill e Andrew Hill, Edições Silabo,lda 2nd Edition Lisbon 2005.

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- Low number of participants: 10 key persons at Galp energy separated by departments physically.
- Through interview it is expected to obtain a better participation, due to the social effect causing a needed emotional response to the question.

The last point is relevant because we want to know how they would react automatically according to their system 1 (See the two system of Kahneman page 32) of the brain when faced with the project as a desired state. One of the point to be tested here, also, is the fact that if the response to a project in terms of results is obtained from their system 1 or system 2? The belief is that a response from the system 1 is more likely to happen according to the understanding of the Theoretical framework.

Why this test is trying to avoid a questioner causing a better rational answer from the system 2? Because, it is a painful process that most persons leave to the end, which would delay their answer needed to proceed with the project. Nevertheless before the interview the idea of giving some time to reflect on the subject, by sending an e-mail with the purpose of the meeting giving time to the brain to prepare an answer rationally.

What if the person to be interview doesn't answers the e-mail, or schedule a meeting with the project manager?

The idea is to use the social effect explained on the page 40, through network and authority, to influence their behaviour. One of them shall work according to the situation.

The desired stated (Result):

This project section is relevant to be study, due to the fact that all managers always need to know when a project is doing great or doing poorly according to the outcome expected. The desired state of the project must be recognizable according to criteria that are agreed on by the participants. The criteria will hopefully relate to all three constraints in conventional project management – time, cost and scope – but this is not necessary. The important factors are that the definition is credible, in that the principal stakeholders agree on a common set of objectives that are recognizable. [67]

The GALP case:

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[67] "PROJECT MANAGEMENT AND SUCCESS IN ACADEMIC RESEARCH", Lori Criss Power, Dr Gillian Kerr , May 2009

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<u>According to the promoter of the project the desired outcome contain these points:</u>

- The information from the files that constitute the FIP must be clear, quick to access through research in a data base.
- The project must avoid increasing costs, or present an outlay of cash, and must reduce the costs associated with the papers and toners used in the printer related with the printing of the FIP for approval.
- Respect of the GALP energy internal rules
- The design and the implementation of the project should be done in 6 months (Delivery date - March 26, 2010).
- Must be easy to use.

<u>According to the others stakeholders of the project:</u>

- The information from the files that constitute the FIP must be clear, quick to access through research in a data base.
- The software's to be used must be user friendly
- Reduce the time and amount of workload associate with the archiving of the files.

These are the main points obtained from the interviews. Other aspects were presented like each one of them, for instance, choosing the specific software which they feel more comfortable with, or the layout (or presentation) of the information. However due to the disparity of opinions and expectations on this field, the idea was to exclude them from the desired stated of this project that must represent clearly the final expectation in which everyone would agree.

Which are the main resources available for the execution of the project?

During the interview presented to answer the question related with the desired state or outcome of this project, others questions were presented related with another topic, particularly with the resources available. The questions were: "Which are the materials available and which one would you feel comfortable to work with? Who would you recommend for the development of this project according to this subject? (If they present someone) Can you give me is contact?"

The answers lead me to point these resources:

- Papers

- Printers
- Scanners
- Computers
- Software's:
  - MYGALP(Microsoft® SharePoint®)
  - SAP
  - Microsoft® office
  - Shared server.
- Human resources:
  - 4 persons related with the archive of the files that constitute the FIP.
  - 5 Persons related with the approval of the project´s FIP.
  - 3 Persons related with the beginning of the process, and several persons related with the elaboration of the FIP allocated in the logistic and the refineries.
  - 1 Person responsible with the MYGALP SharePoint software.
  - Several persons related with the SAP software and shared servers working in the supplier company of these software's and equipment's maintenance.

Predicted costs of the project:

All of the Human resources presented are not directly allocated to this project. Therefore their cost is not directly associated with the project since I am not going to pay any fee for their assistance, assuming that they assist since they have no obligation with the development of the project. Nevertheless when contacted they presented their availability to offer their help if needed.

The Cost of these resources are considered to be irrelevant (including the opportunity cost) since they are not directly allocate with this project, with the exception of the ones related with the papers used and the printers toners and computers energy's spent. Therefore, in terms of costs, the main idea and focus at this moment will be to avoid increasing costs and maintain the ones already existing so far. No research and calculation of the financial development of this project will be presented due to the irrelevant weight they might attain in the company financial state.

5.6.   Credible and compelling measures of deviation from the desired state:

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Before the presentation of the final solution, the planning of the project consists to review the decision biases and heuristics that could lead the project away from its desired final outcome presented above (Chapter 5.5). The objective of this chapter (5.6), consists, according to Daniel Kanheman, in stimulating our system 2 thinking, through the system 1 gut feeling to identified the possible risks in the decision/adaptation process of the stakeholders to the final solution. After this first analyze, the second step consist to connect this analyze of the decision biases and heuristics into the choice architecture design preparing the solution to be presented.

About this chapter 5.6, the suggestion, and strategy, consist in creating a checklist of the biases and heuristics presented on the theoretical framework (chapter 5.2), and do a critical analyze on their possible existence and impact during the development of the project. The presentation of a solution to reduce their impact can be presented on the check list or in the choice architecture design to be presented on the next chapter 5.7.

This approach is executed individually and complemented with group discussions to obtain the maximum feedback and contribution possible, in order to reduce the probability of failing any important aspect to analyze. The gathering of the information was also performed through several interviews in order to test individually the capacity to analyze the biases and heuristics without the influence in their answers of others. This last option of my test consisted in avoiding the social effect that could influence others to avoid giving some feedback on their own.

Here is the list of the biases and heuristics found, and their respective moments where they are expected or known to occur, as well, as some strategies to reduce their impacts:

Summary of the bias found during the actual process:

1. **Loss aversion** - There is the possible loss of habits and procedures already absorbed by some stakeholders where leaving the use of physical paper might create some discomfort to adopt due to the feeling of loss. Besides that situation, no loss is expected during the implementation of the project and during the use of the final product obtained.

2. **Status quo bias** – tendency for people to like things to stay relatively the same. This decision biases is somehow related with the comment presented on the loss aversion, and might need a specific strategy to be analyze in the choice architecture, to motivate a change

on their practices to the new solution and avoid or reduce the resistance that people have to stay with their habits.

Summary of the bias and heuristics found during the preparation of the solution to be presented:

1. **Endowment effect** – the tendency for people to value something more as soon as they own it. People value more the processes they fell they are responsible for, instead of projects which they don't have direct interest. During the progress of this project, involvement of the persons affected by this project is essential for its success.

2. **Hyperbolic discounting** – the tendency for people to have a stronger preference for more immediate payoffs relative to later payoffs. The end product resulting of this project, must present as soon as possible a solution that represents immediate payoffs of their time.

3. **Information Bias** - The tendency to seek information even when it cannot affect action. During the study and the execution of this project it's relevant to only seek the essential information, to avoid the excess of information and consequently an "information blockage"[68] which is the loss of focus on the important aspects. It appears that an excess of information is counter-productive. The wealth of information creates poverty in focus and therefore deviation from the project core objective.

4. **Outcome bias** – Tendency to judge a decision by its eventual outcome instead of the one based on the quality of the decision at the time it was made. This bias is related with the orientation toward the end result of the project. It seems clear from here that the most important is the end result of the project. For instance, the most important for the supporters of a soccer club is not the training methods of a coach but the results expected of the team during the season.

5. **Planning fallacy** – Tendency to underestimate task completion times. The project needs to be implemented in 6 months including studies. My solution to this bias is to focus on the preparation time of the implementation, and elaborate all the steps to be realized in paper, making the execution afterward faster. Nevertheless, the clients of this project and all the persons involved on its development will suffer from this bias. Therefore, my strategy

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[68] Book "How we decide", Jonah Lehrer, Lua de Papel´s Editor, 1st Edition January 2010 Page 147 to181.

consists to negotiate an overestimate task completion time, with a 10% (Random contingency number) increase on my initial time expected. It is always better to finish earlier avoiding unnecessary delays than feeding the clients impatience.

6. **Selective perception** – The tendency for expectations to affect the perception. This bias might be the most important. Most of the preparation, implementation of this project is based on managing the expectations. The strategy consist to give a basic expectation at the beginning the project to make it start, and decreasing it during the implementation until the conclusion, increasing it again in the end. This line of thinking is related with the interpretation of the theoretical framework, as for instance, with the dopamine fluctuations presented on page 35. The graph below (Figure 17) explains the way to manage the process in terms of expectation:
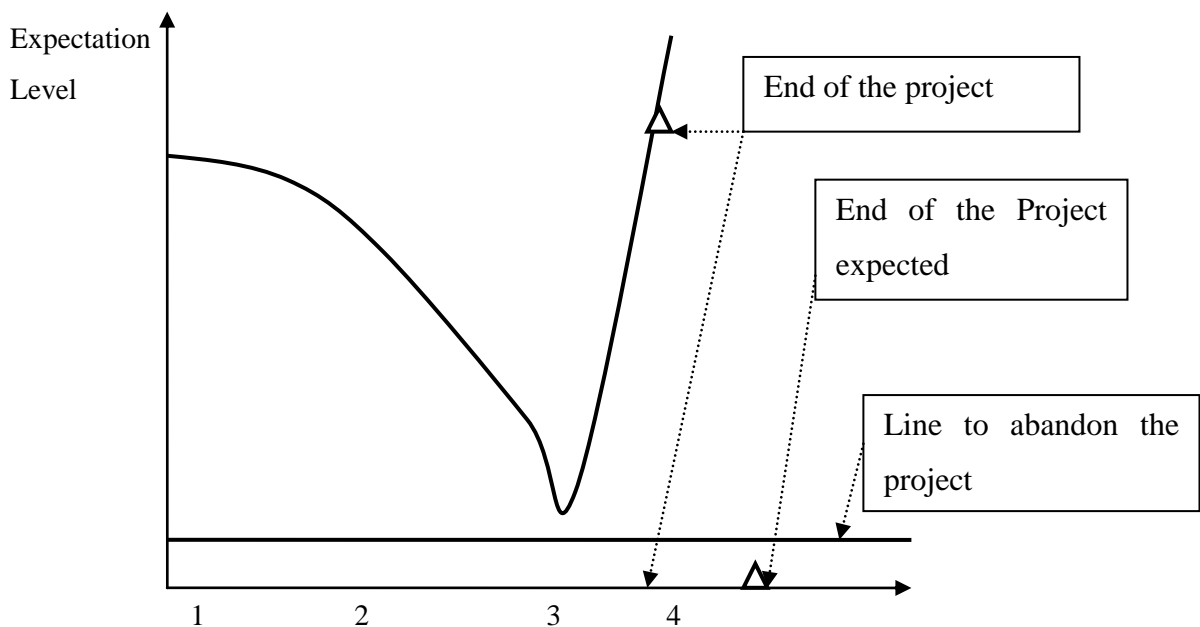
Figure 18: Expectation management Model

The Moment 1 represents the selling moment of the project, where the main focus is to perceive the emotional need to approve the beginning of the project execution. It is expected according to the interpretation of the theoretical framework, that the approvers of this project will use their pre-frontal cortex to reach a decision, so it is important to build a rational line of thinking behind it. In this case, the project was born due to a desire to reduce the expense of paper in the P&C of the SRL. That was the main product that sold the existence of this project. It is expected a huge stimulation of dopamine toward possible outcomes to obtain.

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The moment 2 represents the presentation of several difficulties, and most importantly, problems that would emotionally decreased the expectation of a good result. During this moment the strategy is to collect the worries and expectations at this point, defending the idea that it would be difficult to reach their solutions, even knowing that they exist, challenging the client beliefs on an easy solution, managing their expectation that it will get better with lines like: "I'm still studying solutions" or "this aspect is not yet finish", even if we have the final product expected. This moment will help manage their expectation of the time completion of the tasks, as it will seem impossible to complete it in time. It is expected with this approach to be able to manage the planning fallacy bias, due to a decrease on their expectations. It is important to say, that the strategy is essentially about challenging the clients belief that this work is complicate to finish, presenting several difficulties and challenging them mentally.

The moment 3 is another moment where at least 25% to 50% of the initial expectations are reached, showing a basic non-visually attractive solution of the main structure, that doesn't stimulate their emotional aspects. Notice in the graph (Figure 17), that it is crucial to not let the expectations getting below the line where the promoters of the project would give up on it. There is an extra need to be careful when applying this solution and to constantly seek feedback from the stakeholders.

The moment 4 is the most important moment according to the outcome bias, where the judgment of the project will be made. So, the idea is to use the dopamine and emotional aspects in the brain, to sell the project way above the initial expectation with bonus solutions like in this case, the workflow of approvals to be presented on the chapter 6. Stimulating their dopamine should increase the focus on the project, and the bigger the "distance" of the expectation before the final result the bigger the amount of dopamine to be released, increasing the sense of good feeling toward the project given. It is recommended to provide some cakes, sugars, and other stimulations to increase the happiness associated with the final product presented.

Don't forget that the memories are built according to the way we feel in the moment, as presented in the theoretical framework.

7. **Anchoring** – Tendency to rely too heavily, or "anchor" on one trait or piece of information when making decisions. As I explained before, this bias is relevant to manage

expectations; since they don't know how the project is developing (Importance of confidentiality) they will rely on any piece of information given. According to this, the information to be presented must be wisely choose and put their judgment where it is needed.

8. **Availability Heuristic** – a biased prediction, due to the tendency to focus on the most salient and emotionally charged outcome. This biased prediction, reinforces the strategy presented on the moment 4 in the point 6 – selective perception - strategies.

9. **Gambler´s fallacy** – the tendency to assume that individual random events are influenced by previous random events. For instance if a dice is played and we obtained 3 times in a row the number 5, there is a tendency to assume that the next number to appear if we played the dice for the 4th time, to be 5 again. According to this, all of the data and events presented to be analyzed for the execution of project must be treated separating the random events like human behaviors, and the non-random events like the software sending alarms to the users which is controllable. According to this bias it is important since most of this project is related with human's behaviors, to prepare a plan of contingency toward any unpredictable decision of the persons involved. That is why, there is a need to reinforce the idea that this project is not about manipulation, control or obtain precise results in the end, but about reducing the uncertainty associated with the human behavior to reach the closest possible optimal point of satisfaction and adhesion toward the end result of the project of each stakeholder involved.

10. **Overconfidence effect** – tendency to overestimate one's own abilities. Humility should be present on all steps of the elaboration the project, which means listening others, accepting others point of view and never act without planning carefully with the pre-frontal cortex (not only emotionally with the gut feeling).

11. **Illusion of transparency** – People overestimate other's ability to know them, and they also overestimate their ability to know others. Once more, listening carefully, and communicating several times with the persons involved, trying during all of the conversations, to answer the needs of the project according to what they feel should be essential for the success of the project. The idea is to try to make their needs the more transparent possible, listening their complaints and analyzing their perception of their abilities. A good rule of thumb is to assume that we never know enough about each other. For

the success of this project, according the interpretation on the book "Art of the war"[69]: "Hence the saying: If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle". Therefore we need to evaluate ourselves and the clients, constantly, to guarantee a successful result, without assuming in any point of the project that both sides are fully understood. Feedback is essential and must be constant.

12. **In-group Bias** – preferential treatment people give to whom they perceive to be members of their own group. Since I'm not fully an employee of the company, it is relevant to perceive how to fit in their group. For instance, since I'm allocated in the P&C of the SRL department, they somehow perceive me as a member of the team, and therefore it is OK. But what about the refineries, logistics and other departments? To succeed there, it will be relevant through network, to know more about the other persons, like checking their Facebook, or description of their task, and try to realize some common points of interests and group activities (Sport activities, club that we support, Political activities, social activities…), that we may discuss to increase their perception that we belong on their team.

13. **Framing effect** – Drawing different conclusions from the same information, depending on how that information is presented. Presenting the information positively at the beginning (moment 1) negatively on the moment 2 and 3, and extremely sensational on the moment 4 is the strategy associated to work with this bias. Nevertheless this bias is important to be known because; saying that "the project is half complete" and "the project is half started" have different effects, even if they stand for the same. This effect is very important strategically.

14. **Reactance** – Urge to do the opposite of what someone wants you to do out of a need to resist a perceived attempt to constrain your freedom of choice. I put this bias in the end to emphasize the need to keep this kind of planning confidential, because once they perceived they are under a scheme or under a stimulator of action, they might resist and react in the contrary of what you said. Then emerges the need to apply the reverse psychology which is not always easy. The important is that the end result benefits them at all costs; otherwise if they perceive that they were part of a scheme without personal benefit, resistance is more likely to happen. Don't forget that the main idea is to focus and plan a choice architecture

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[69] Book "The art of war", Samuel B.Griffith, 9º Edition illustrate. Evergreen (2007).

based on their needs (optimal point, desired state). Not on the project manager's personal needs. The project manager own gains, should be a result and not the objective.

15. **Authority bias** – tendency to value an ambiguous stimulus according to the opinion of someone who is seen as an authority on the topic. In Galp energy, the authorities are clearly identified by their ranks. However some others persons have "strong" personalities and abilities on certain topics that might be essential to influence others, including their chiefs. Those persons are identified, however for the confidentiality of this information their liaison is not presented here. This strategy is related with networking. Who knows who? This is important since most of the persons in the company are unknown, so the use of the personal network to reach important key persons for the success of this project is important. I want to emphasize my opinion that the success of any project doesn't not depend on the project manager, but on the quality contribute of everyone involved.

The next Chapter to be presented below will initiate the process of design of the choice architecture, integrating the decision biases and heuristics presented above, through stimulation of the persons involved in the project to create the solution intended. This process was initiated in the planning phase of the project and constantly updated during the implementation phase. The six tools presented in the next chapter (5.7) were introduced in the theoretical framework (Chapter 5.1).

5.7. The Choice Architecture:

In this topic the tools of the choice architecture and the problems found will be presented and discuss along with the presentation and use of the bias and heuristics from the last chapter (5.6), creating in the end, with the sum of its parts, the design of the choice architecture to be implemented for the success of this project.

First problem (Choosing the correct IT solution)

The idea and objective of the project (presented on the chapter 5.5) is important certainly, however it seems to have some internal dispute on which software or procedures we should adopt to make this desire reality. How to solve this dispute? According to the Book "Nudge" 2008, presented on the theoretical framework, defining a procedure or software as default would solve this problem, however, due to the status quo (decision bias) problem of the stakeholders to stick to their habits and try to avoid the boring tasks of learning new

procedures, giving them an option to use other procedures beside the default option, would eliminate the possibility of harmonization of the process since everyone would choose the solution of their best interest and the dispute would continue (as the mess on the files). On the other hand, putting a unique solution as mandatory from the boss would "destroy" the idea of freedom of choice of the persons (As well as the objective of the choice architecture) giving place to a decision bias named Reactance which leads the employees to urge in the opposite direction trying to justify why the software applied is not the best solution, always criticizing, as a need to resist to a perceived attempt to constraint their freedom of choice, and putting the welfare of the stakeholders at risk of the project's manager own biases as well. Therefore the first problem is:

1. Which IT solution should be applied?

Associated with this problem, there are two decision biases that may affect the advance of the project:

1. Status quo - tendency for people to like things to stay relatively the same. Resistance to change.
2. Reactance - Urge to do the opposite of what someone wants you to do out of a need to resist a perceived attempt to constrain your freedom of choice, due to the imposition of the IT solution.

That is where the need to "understand the mappings from choice to welfare" in the Choice architecture design is essential, to explain why, and the "structuring of complex choices" to make the solution clearer and transparent, to make the solution more reliable and to enhance the endowment effect (Decision Bias) which in this case could benefit the project by giving the feeling to the stakeholders of belonging or ownership in the process.

To better understand the mappings from choice to welfare and to structure the complex choices of software, the strategy consisted in presenting a Manual (With frequently asked questions) that would explain each steps of the procedures as well as the benefits and problems that each one of them would obtain by using the specific selected software, explaining why others are inadequate showing them the difficulties found. The manual has also the objective to explain how to reach or complete a certain task without difficulty. With a well elaborated manual, the time dedicated to training is reduced, increasing the individual capacity to solve personal doubts on the procedures autonomously. Nevertheless to complement the success of the manual, as explained in the chapter 5.2, the manual must be filled with emotionally charged messages, to enhance their learning and pleasure to consult the manual. Otherwise it is just another complicated and boring book.

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Therefore to solve the problem presented above the choice architecture tool to use is:

1. Understand the mappings from choice to welfare.

2. Structuring of complex choices.

Associated with this solution, the following decision biases will help us succeed:

1. Endowment effect – the tendency for people to value something more as soon as they own it. People value more the processes they fell they are responsible for.

2. Authority Bias - tendency to value an ambiguous stimulus according to the opinion of someone who is seen as an authority on the topic.

Involvement is important, and according to what we discuss so far, including the stakeholders in the solution process will help them to map their understanding to the best solution, explaining why their options are correct and not. However another bias is relevant to help this process "flourish".

The authority bias, gives to a specific individual the credibility to emit an opinion and that opinion been accepted as the correct one due to a perception that the person is an expert on the field. For instance, in the author case, due to his background, the persons believe that he was an expert on IT solution and therefore the solution and explanation presented on that matter were the best. This bias will help the progress of the project if we control two other biases: the overconfidence effect and the illusion transparency. The tendency to overestimate one's own abilities and the fact that people overestimate other's ability to know them, and they also overestimate their ability to know others, might affect the quality in the judgment of the final solution to be presented. Therefore the authority bias can be use, however with a rational control on its content. To conclude the explanation and importance of understanding mappings from choice to welfare, it is relevant to add, that this process must be present not only in the planning phase be as a complement of the constant feedback we need. It will serve as training on the subject, and preparation to adapt the stakeholders to the new process.

Therefore the solution presented with the tool "understanding the mappings from choice to welfare" are:

1. Manual explaining the process, including frequently ask questions (FAQ).

2. Project development giving periodical presentation to explain the mappings.

To complement this tool, we need to structure the complex choices.

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As project manager it is relevant to choose the software based on the preference of the stakeholders, but also through elimination by aspects (Amos Tversky (1972)) eliminating the aspects that doesn´t meet the desired outcomes presented in the chapter 5.5. This elimination is presented in the chapter 6.

When structuring complex choices, it is relevant to separate the aspects which we can anticipate their outcome from the aspects in which we cannot. This point is necessary to control the potential effects of the gambler´s fallacy decision bias. The tendency to assume that individual random events are influenced by previous random events might lead the structuring of complex choices not possible to structure. In this project, it is not expected any risky random event to occur. However, for instance, can we assume that an employee will never forget to update a database? It depends obviously, according to the presented on chapter 5.2, on the habit of the employee to perform the specific task. So when the process is new can we trust that he will not fail? The answer is unpredictable and therefore not possible to guarantee with certainty. This is an example of an aspects that should be assess within the tool "expect errors" from the choice architecture, and despite the fact that we can include it in our structuring of the complex choices, this random events, that will become more trustworthy in time, with training and habit, (System 1 from Kahneman, check chapter 5.2) should be analyze carefully. The solution and result of this work is presented on the chapter 6.

Transparency and Reactance in the Project. The importance of giving Feedback

The Key words to succeed here are Transparency and Adaptation. For the choice architecture success of its design, the key aspect to be understood is transparency. On one of the author interesting lunch with his colleagues about the choice architecture, one of them revealed severe concerned on the subject. The main reasons pointed, where related with the worried to see is freedom constraint by the design of the choice architect, (Reactance all over again), and the worry to see himself nudge toward a decision that he believes to be harmful to is welfare and dependent on the choice architect point of view of the optimal solution to be implemented. These concerns are real, and present in the stakeholders involved in the project. The question is "Who is this person to decide what is correct or wrong for them?" the answer according to what was presented in the theoretical framework is that the optimal point to be reach is not, and should not, be set by the project manager, but given by all the stakeholders involved, giving them transparency on the development of the process to guarantee that they receive enough Feedback (One of the six aspects or tools presented to guarantee success on

the choice architecture.), without forcing certain outcomes to them but only nudging them toward the correct decision, not designed by the project manager, but designed by all!

Therefore to reduce or even eliminate the effects and dangers with the reactance as a decision bias that could lead the project away from the desired stated, transparency is necessary, giving the biggest number of choices possible, and guaranteeing a perfect understanding on the map of choice to welfare through constant feedback and a clear structure of the complexity of the choices.

The process of giving and receiving feedback is the most important "fuel" to make this project progress. Within this tool, the following decision biases are present:

1. Anchoring – As part of the negotiation process.

2. Availability Heuristic – As part of the expectation management.

3. Framing effect – As part of the negotiation and expectation management.

4. Selective perception – as part of the expectation management.

Through those biases it is expected to reduce and manage the impacts of some biases presented so far, like the reactance or the planning fallacy. We can anchor their perception in a specific piece of information during a meeting, to affect their expectations to focus on the most emotionally charged outcome, and therefore concentrate in a specific aspect of the project, like a software, procedure or even attitude. For instance, presenting the desired outcome intended for the project will increase their focus on those objectives. As an example, one of the desired outcomes was to present a software solution that "Must be easy to use". When presenting an image explaining that a child was using the same software they have, this simple piece of information stimulates them to focus and try to understand how a kid can use it and they cannot. Two aspects from the chapter 5.2 are here. The emotional pressure, that stimulate the dopamine to enhance their will to learn, and the social effect due to the fact that don´t want to admit that a child as more capacities than they do.

Therefore giving feedback on how the project is developing and most importantly, how the stakeholders are doing, makes the project easier to manage enhancing the endowment effect intended before, increasing the understanding of the mappings from choice to welfare, and making the structuring of complex choices easier.

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Nevertheless another problem, related with the poor presentation and naming of the files in the shared server as showed in the figure 19 below, makes it difficult to understand the content of the files and if some files or documents are missing to complete the FIP.
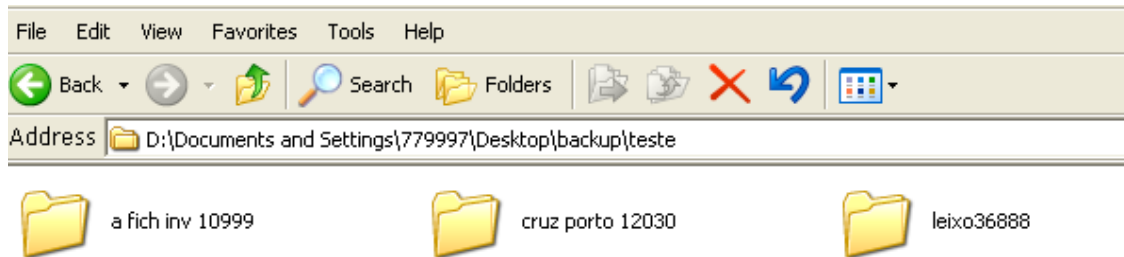

Figure 19: File organization

This situation is a clear example of a poor feedback. The solution must be related with the clarification and harmonization of the archive as we will present on the chapter 6.

Expecting errors. How to avoid them:

Not expecting mistakes, errors, deviations from the desired stated and risks, is without any doubt the biggest mistake. Humans are known according to Kahneman to have two systems on the way they think, as we saw in the theoretical framework (chapter 5.2). Just to remember, one system, the system 2, is "slower, serial, effortful, more likely to be consciously monitored and deliberately controlled; they are also relatively flexible and potentially rule governed" while the system 1 is "fast, automatic, effortless, associative, implicit (not available to introspection), and often emotionally charged; they are also governed by habit and are therefore difficult to control or modify". When asked which of the systems is more likely to be used, the answer should tend toward the effortless system, the one that is fast and automatic governed by habit. Yes the system 1. The conclusion to be expressed from the text above, is since only specific actions and decisions in a specific moment are controlled by our system 2 (our Conscious part), most of our actions are done unconsciously by the system 1 and therefore more exposed to errors like, as an example, the post completion error of (Byrne and Bovair 1997) presented in the chapter 5.2.

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Going from theory to practice, error and mistakes are certainly to be expected during the development and after the implementation of this project. That is why; having a software or procedures, not controlled by Humans, to assess their actions and prevent failures is essential. Therefore expecting errors as a tool of the choice architecture makes all the sense.

Here is a small list of the possible mistake and errors that could affect the process in form of questions and statements:

• Mistake during the fulfilment of the database, (Solution: the software fulfils the data for the users)

• Where the project is? Whit Who? (Solution: the software tracks and follows the process. The workflow solution)

• How much time is left to complete the approval Task? (Solution: the software sent feedback like alarms when the due date is approaching to all the persons involved)

• Some files are missing. (Solution: Creation of a checklist to be filled before sending the process)

• We forgot how to send the process and search in the system for it (Solution: Creation of the manual to guide and answer FAQ. Solution already proposed in the last three tools presented of the choice architecture)

• We printed the wrong file to sign as approved, and as a consequence we waste a lot of paper. (Solution: creation of only one sheet to be printed and signed)

• We forgot to print on both sides of the papers on now we spent more paper than needed. (Solution: Put the printers to print on both side as the default option.)

Options by default:

Looking back at the solutions presented in the errors expected, defining the printers to print on both sides and software alarms (Reminders) to recall them the need to update the status of the approval as the default option, is important. They still have the option to eliminate the e-mails , alarms sent, or change the way they will print the documents on the printer (Instead of colour, putting the black and white printer as default) will not mitigate their choices. The stakeholders will continue to have the same opportunities to adopt a way or

another, of printing documents, or simply to ignore or remove the reminders. Whit this operation it is expected to reduce the cost associated with:

- Mistakes made during the printing of the documents,

- The opportunity cost associated with the time spent searching for a FIP lost, and not present in the database.

With this choice architectural tool it is expected to benefit, instead of been negatively affected, with the status quo bias. The fact that the stakeholders still have the opportunity to choose reduces the effects of the reactance, and since no process is lost, the risks associated with the loss aversion are technically inexistent. To summarize, here are the biases whose effect was reduce and availed:

- Loss aversion (Avoid effect)

- Reactance (Avoid effect)

- Status quo (Switch from negative effect to benefit from it)

Incentives to stimulate, the social favour:

The right incentive as we saw before consists in putting the right incentives to the right persons. Now that is a difficult challenge. Having the right incentives means understanding the individual's desired state of the project. For instance, reducing the probability of making errors is part of the desired state of the project. The reduction of inefficiencies is an incentive, since it represents less work in the process. The endowment effect states clearly that once they feel the project as theirs and essential for them, like explaining the perk associated with the search process of the folders, as a result they will give it more attention and feel happy to work for it to reduce the time on the boring task of searching files. However, it is not only about reducing inefficiencies. It is also about fulfilling their key performance indicators (KPI), in which a monetary reward is given when objectives are accomplished. For instance, some employees are evaluated in their KPI, according to their research efficiency of the files and follow up of the FIP during the approval workflow. The less time it takes those to approve the investment project, the better their result on the KPI will be. Therefore one decision bias is present here, the hyperbolic discounting, which is the tendency for people to have a stronger preference for more immediate payoffs relative to later

payoffs. The faster the project is implemented, the faster they will see their results improve and no loss is expected. Therefore the loss aversion will have no effect.

Another important aspect presented on my theoretical framework to nudge people toward the optimal solution for all, is to manage the social effect around it. For instance, as a trainee in the company, how could we decide what is best for them, and why would anyone follow our leads? People give preferential treatment to whom they perceive to be member of their own group. This is not a system 2 from Kahneman action, because rationally thinking about this, it makes no sense. It is clearly emotional. Therefore this is one of the effects that appears from our emotional side, influenced by the social effects associated with it, which without fully understanding why, our emotions are telling us that we belong on the same side, and that what we feel is what other members of the group feel. This is a perception caused by the ideas of the In-Group Bias.

The social effect is according to the theoretical framework, an incentive in the choice architecture design and should therefore be plan carefully. In-Group Bias is only a small portion of the social effects that could nudge decisions and behaviors. Understanding on which group we belong and which groups influences others, is a crucial part to put a project back on track according to Powers, L.C & Kerr, G (2009). However due to the decision bias "illusion of transparency", this analyse was restricted to common and observable facts that confirms the ideas of interactions, complemented by the normal hierarchical structure of the company, their experience and by the interviews (Formal and casual). To summarize, the decision biases used and found with the use of this choice architectural tool are:

1. Hyperbolic Discounting

2. In-Group Bias

3. Loss Aversion

4. Illusion of transparency.

To conclude this chapter related with the choice architecture approach, it is relevant to say, that this approach helped, like a checklist, to think about the entire process, difficulties that might emerge, solutions that need to be applied, and design the solution presented in the next chapter (chapter 6).

CHAPTER 6

The Solution Presented

After using the choice architecture approach and designing the process, to help protect the desired outcome from deviation caused by the decision biases and heuristics, here is the solution applied in the project:

Solutions for the Archive:

According to the interviews, one of the main concerns consists in having only one place where all the files could be found according to what each department has. So after consulting what is the responsibilities of each department, it sounded agreeable to each part that the process is mentally centralize in the P&C SRL, but physically in each department. Therefore the solution consists in reducing the bureaucracy associated on each department to archive his files, and create a common space to all the projects reducing work avoiding duplication of the archives, and disparity of information between areas.
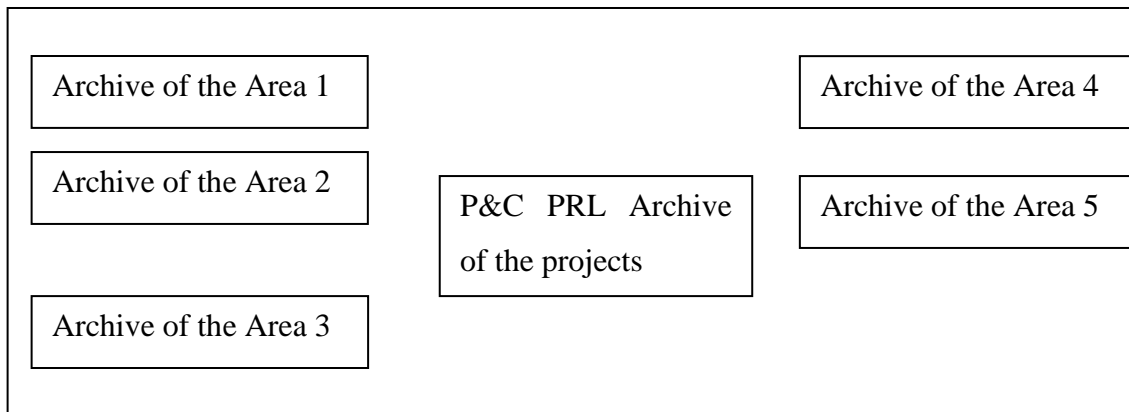
Summary of the process as it is:

Figure 20: Archive process as it is.

Each department archives a copy of the files as they want.

How it should be:

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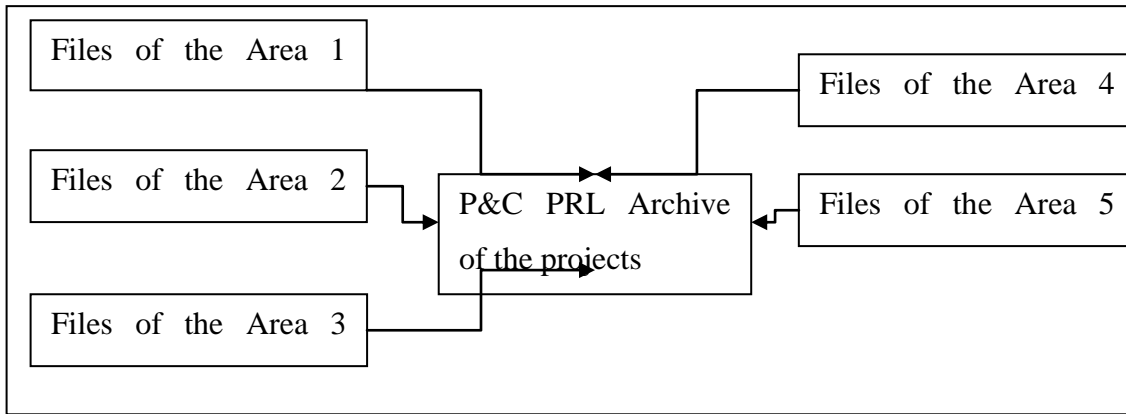

Figure 21: Archive process as it should be.

According to their access, every department contributes to the archive of the projects in the P&C SRL server having the possibility to follow the development of the process of approval directly.

Which software to use (Structuring the complex choice):

There were several solutions presented in the resources available, however we needed that the solution meet the following aspects: one that most people would feel comfortable to use, nice to visit and develop, and with no costs to be increased with its usage. The resources available to be managed were:

- Software's:
- MYGALP(Microsoft® SharePoint®)
- SAP
- Microsoft® office
- Shared server.

Elimination by aspects:

To start the SAP solution was out of the equation, because only 3 persons have presented themselves capable to use it and besides that, the design was not attractive.

Microsoft office was not useful for that purpose, according to their experience to archive files, only to read its content.

So the solution was down to 2 software – MYGALP (Microsoft® SharePoint®) and the Shared server.

From the 2 solutions presented, the solution chosen was the MYGALP (Microsoft® SharePoint®) because of the design, perception of organization and possibility to work with it

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like if it was a shared server window. For instance the shared server had the following presentation:
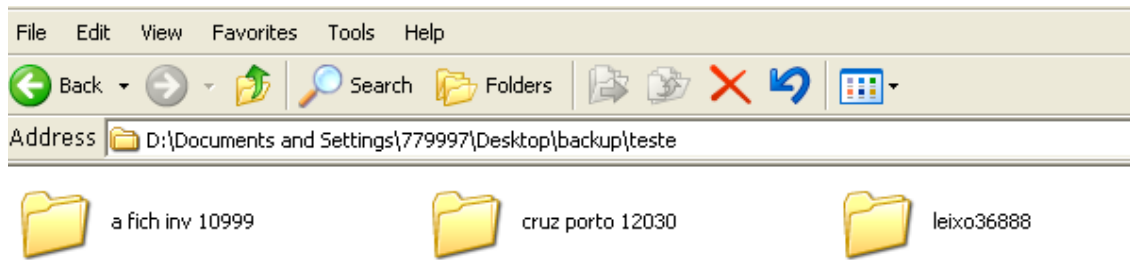

Figure 22: Shared server design and organization

This kind of presentation is familiar to work with, however it is confused and the name of the files not so clear.

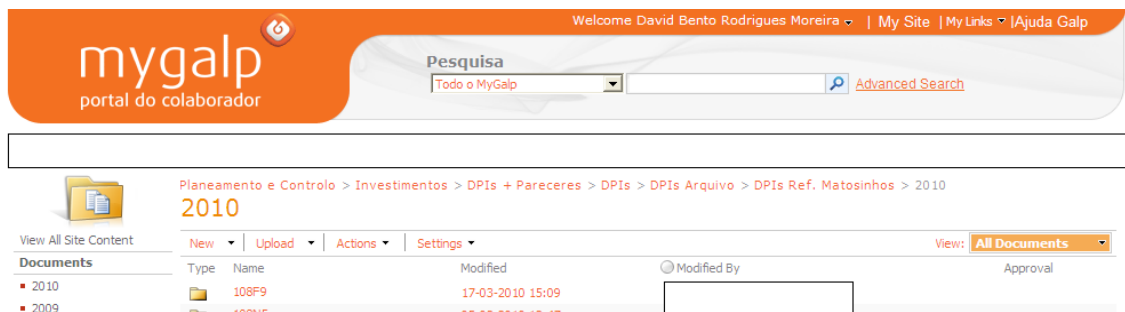The MYGALP (Microsoft® SharePoint®) solution had the following aspect:

Figure 23: The Mygalp sharepoint design

It allows the same kind of working activities like a shared server, however it presents a better interface, much more interesting to explore according to the global point of view of the persons involved.

So the solution to be used is the MYGALP (Microsoft® SharePoint®).

Harmonization in the naming of the files (Giving a clear Feedback):

Now according to the problems presented above, the solution must reduce the time spent to research a specific file in a specific folder. To solve this issue, the following problems were studied:

• The fact that the files are named randomly in the computer makes it difficult to quickly access the information pretended.

• Sometimes the information comes incomplete and, as a consequence, the folders are sent back for correction which is time consuming.

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Harmonization in the files designation is important to increase the research speed of the files and avoid mistakes. The solution presented consists in giving a basic form, accepted by all, to be used in the name of the files. For instance, the opinion elaborated by the P&C SRL should have his files named Opinion (nº of the project) e.g., "Opinion 10505.". The form of investment shouldn't be named after the name of the project itself, but like this: "form of investment (nº Project)". The solution was applied to all of the files included in the FIP.

With this solution the times it takes to identified the content in the folders, is lower, and to identified if any file is missing quicker. That solves the problem to identified the files, however how to find the folders?

Research of the documents and files:

The solution for this situation consists in identifying the areas and the number of project per date and reducing them in groups of 20 to 40 folders per group. The solution given is:

• 4 Main areas identified (Logistics, Ref. Matosinhos, Ref. Sines and subsidiaries companies)

• At least 30 to 70 projects are sent per year on each department for approval.

According to this data, the main folder should be the Areas, subfolder the year, and inside it the projects. Example:
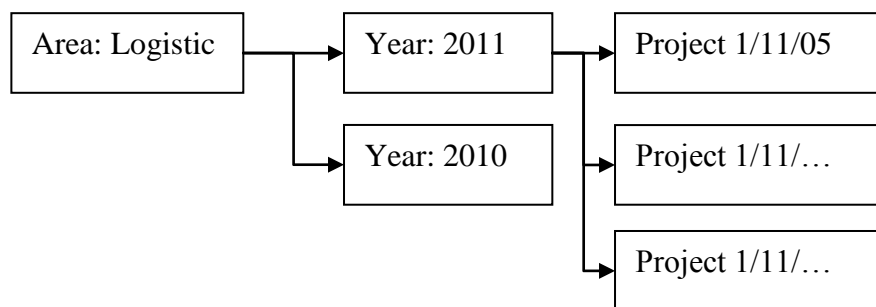

Figure 24: Archive structure

With this organization the folders are expected to be found through 3 ways:

1.   Through the database of the projects.

2.   Through the folders manually.

3.   Doing a research in the top corner "Advanced search" of the following window:

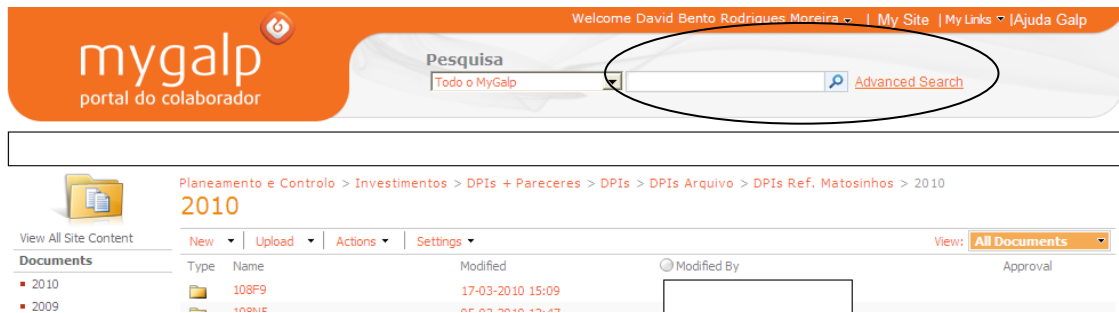Being a choice architect in project management: The GALP ENERGY Example.

Figure 25: Advanced search in the Mygalp Microsoft sharepoint solution.

With the harmonization in the name of the file, everybody can find what it pretends (if given access) without making mistakes. For instance if you want the Opinion on the project 11060 you just have to write in the advanced search "Opinion 11060" and the file appears.

In Conclusion having the name of the files harmonized and having the solution to centralize the process of archive in only one server, will improve the specific need to follow the process of approval in detail. However, as we realized before the archive is closely linked with the approval workflow for the projects. After doing some research on the software considered, the following solution has been discovered:

Workflow of approval (expecting errors):

Workflow is sometimes described as a series of tasks that produce an outcome. In the context of the software selected (MYGALP (Microsoft® SharePoint®)), workflow is defined more narrowly as the automated movement of documents or items through a sequence of actions or tasks that are related to a business process. Workflows can be used to consistently manage common business processes within an organization by enabling the organization to attach business logic to documents or items in a SharePoint® list or library[70]. The document library, referred here as library, refers to the archive system that we have presented above.

Business logic is basically a set of instructions that specifies and controls the actions that happen to a document or item. With this solution another aspect is taken into account from being a choice architect – Expecting Errors. Workflows can streamline the cost and time required to coordinate common business processes, such as project approval or document review, by managing and tracking the human tasks involved with these processes. For example, in an Office SharePoint® Server, we can add a workflow to a document library that

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[70] Michael Sampson, Seamless teamwork – Using Microsoft® sharepoint® technologies to collaborate, innovate, and drive business in new ways. 2009Microsoft® Press.

routes a document to a group of people for approval. When the document author starts this workflow on a document in that library, the workflow creates document approval tasks, assigns these tasks to the workflow participants, and then sends e-mail alerts to the participants with task instructions and a link to the document to be approved. As you can see, we can expect a reduction on the probability of obtaining errors, and we increase the degree of feedback given. While the workflow is in progress, the workflow owner (in this case, the document author) or the workflow participants can check the Workflow Status page to see which participants have completed their workflow tasks. When the workflow participants complete their workflow tasks, the workflow ends, and the workflow owner is automatically notified that the workflow has completed.

The actions in the Approval workflow in this example follow the process shown in the following illustration:
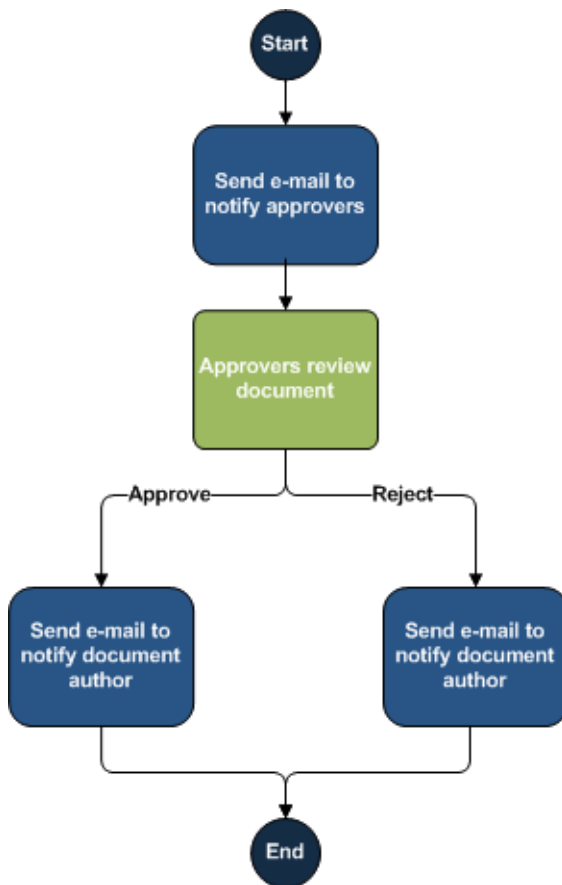

Figure 26: Workflow of approval.

Workflows not only support existing human work processes but also extend the ways in which people can collaborate and work with documents, lists, and libraries. The site users or the employees involved in the workflow process can start and participate in workflows by

using customizable forms that are accessible from the document or item in a SharePoint list or document library. Additionally, the workflow functionality in Office SharePoint Server is tightly integrated with the 2007 Microsoft® Office system.

The Approval workflow supports business processes that involve sending a document or item to colleagues or managers for approval. The Approval workflow makes an approval business process more efficient by managing and tracking all of the human tasks involved with the process and by providing a record of the process after it is completed, reducing the risks of forgetting to update the database, (expecting error), giving feedback about the status of the FIP, if approved or not, (giving feedback).

In conclusion, the workflow will create the best solution, in terms of integration of the areas involved, to support our business process of approval and discussion of the documents, gathering focus on two important tools of the choice architecture – the need to give feedback and expecting errors.

Conclusions on the solution:

As we can see designing a proper choice architecture helped to make the solution clearer to obtain. The project went perfectly, and all the persons involved in the process adopted this procedure without major difficulties.

The default option, the incentives and the mapping from choice to welfare, were not presented here in detail, for the sake of simplicity. The solutions are already present in the chapter 5.7, and presenting details about the manual, the printing options and monetary values in the incentives, are not relevant for the purpose of this work.

CHAPTER 7

Final comments and conclusion:

We can conclude that the use of the choice architecture helps to assess some relevant aspects related with people's management in a project development.

The great lesson that can be drawn here is that understanding the way we think things through and how we act and what motivates us, is essential. Those are the questions that the neuroscience has being on part working on, to created important lines of understanding on these issues.

If there was an important keyword for the success of this project it will undoubtedly help me, what Darwin advocated on is theory of the evolution[71] adapted to this context: The survival and success of this project is not about physical strength, or being more intelligent that made this project survive and succeeded, but was rather its ability to **adapt**.

Adaptation was crucial for this work to progress. Becoming accustomed to the company´s culture and their working habit was essential to be able to adapt a solution to their request. It is this adaptation of knowledge obtained in favour of a continuous improvement in performance that brought this project to fruition. To complement the six tools of the choice architecture, we should consider the adaptation as a possible tool number seven.

Personal Advice:

Sun Tzu wrote in his "book" "Art of War" that before going into battle," First win the war, and then go to war." The choice architecture is clearly an important part of the planning and study phase. However, at this stage, it is still recommended the usual analysis, such as SWOT analysis, TOWS analysis, risk's assessment, among other strategically tools. We must never forget that agents do not work in a vacuum but in an environment full of stimuli favourable and unfavourable for the development of the project. Reflecting on these stimuli and influencers of behaviour is important to avoid the deviations of a project. When planning, all the tools presented are important. Despite the fact that the SWOT analyse was not presented here, it was still implemented in the project planning. Those two approaches complement themselves.

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[71] http://www.quotesdaddy.com/author/Charles+Darwin – 05/06/2010

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Constraint and suggestion for further studies:

This project was executed inside a specific company (GALP Energy), in a controllable environment, despite the high number of stakeholders involved. So far, during the research period, no other project with this kind of approach was found, being pioneer at GALP Energy in the SRL department. My suggestion is to resume further studies in a bigger environment to verify the utility and consistency of this approach. Until now, the choice architecture tools, revealed themselves as useful in small controllable environment.

One of the constraints of this work was related with the short time available to focus on its development due to the existence of several projects competing for attention. Nevertheless, the time dedicated on its application and the results obtained were absolutely pleasant. The company reduce costs, and became faster in the approval process of the investment projects. My suggestion consist to executed other studies using those tools (tools from the choice architecture) when time is not a constraint, to observe if other interesting results (Only Qualitative results can be compared) can be obtain.

The analyse of statistical data, related with the success of this project, was not presented, since the population, despite being known, have not shown availability in the short term to answer any kind of questioner that could give us some data to analyse and enrich this work even more. Therefore the data available are the exceptional testimonies presented in the project's result. My suggestion for further research consists to collect and analyse, data obtained from the implementation of a design solution according to the choice architecture.

PROJECT´S RESULT:

To better explain the result of the project, here are some testimonies from the SRL´s P&C Director, and from the asset management´s chief about the development of the project. Let's begin with the SRL P&C Director:

"*It was in a way somewhat surprising that we achieve a major advance in the process of the validation and approval of the investments in the Refining, Supply and Logistics Business Unit (of Galp Energia). David Moreira, a trainee at that time was asked to solve a (medium) challenge – attending to the B.U. Investment Process, logical to support plus procedures design, in a (new) way to allow digital archive and reduce paper. Our Team support an average of two hundred new investments per year, and all of the documentation involved filled a lot of space, as in Lisbon, as in the industrial sites, with duplicated copies also.*

The solution overcomes the challenge. Attending at the democratizing of the technologies, the conceptual design tried in the "MS SharePoint", and with a crescent enthusiasm and involvement of other team members, David achieved more than the digital archive – really, after a controlled period of internal experimentation and fine tuning, we started a new year with a new workflow process. That new process made easier the sharing of documents, the discussion and analysis, in a clear and transparent process with clear responsibilities of all the parts.

In fact, in this way, we advance in a more simple process, recognized for all, with better quality and breaking frontiers, developing trust and team work. David, also was very recognized for his successful contribute, and now is no more a trainee but someone of the team with the same opportunities but with a great potential to realize, having other meaningful challenges and contributes."

Francisco Viana (SRL P&C´s Director)

12 / 05 / 2011 – letter

Now the testimony of the SRL P&C assets management chief:

"*The FIP´s workflow (Folders of investment projects) of the SRL was an initiative which I believe have had a high degree of success for the Planning and Control of the SRL Business unit, which has also had a good reception by the SRL´s Administrator at GALP Energy, the Refineries and Logistics.*

The project has facilitated the process of opinion and approval of investment projects for the SRL business unit and as a consequence, increased collaboration between the parties and has ensured the files maintenance on the FIP's MyGalp platform. Regarding the latter point, it is commendable that it has eliminated a lot of paper (because the file was done this way before and filed into folders) which allowed a reduction of costs.

In addition, allowing more data organization, a quick access to information and reinforces the existence of a more uniform and better quality of processes - key points to allow subsequent post mortem examination and / or audits.

The process is already a bet won and is a good example on how you can leverage the existing technological resources to streamline processes and "buy time" that can be allocated to other activities."

José Melo (SRL P&C´s Asset management´s Chief)

12 / 05 / 2011 – E-mail received.

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GLOSSARY[72]

Barrel of oil (bbl)

A unit volume measurement used for petroleum, based on the volume of one barrel, equal to 0.15891 m3 for a crude oil barrel at 60 degrees Fahrenheit (15.6ºC).

CO2

Carbon dioxide, a colourless gas, heavier than air, from which it is one of its natural components. It is produced through natural processes such as the carbon cycle and by the combustion of fossil fuels.

Cogeneration

Generation technique for combined electricity and heat production. The advantage of cogeneration is the ability to capture the heat produced by the fuel whereas in classical electricity generation this heat is lost. This process also allows the same facility to meet the heating (hot water or steam) and electricity needs of both industrial and local authority customers. This system improves the energy efficiency of the generation process and reduces fuel use.

Combined Cycle Gas Turbine (CCGT)

Electric power plant that usually integrates a gas turbine and a steam turbine. CCGTs have a first-cycle gas turbine that generates electricity through the combustion of gas. The exhaustion gases (heat) out of this process are converted into steam in a heat recovery steam generator, which then fuels a second-cycle steam turbine, producing more electricity.

Cracking

The refining process of breaking down the larger, heavier, lower-value and more complex hydrocarbon molecules into simpler, lighter and higher-value molecules. Cracking is carried out either at high temperatures and pressures (thermal cracking) or with the aid of a catalyst (catalytic cracking) which enables, for the same temperatures, a deeper and more selective conversion of heavier fractions.

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[72] Source: Annual report 2009 – GALP Energia

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Fluid catalytic cracking (FCC)

Cracking process using a fluid catalytic agent that is continuously regenerated. It is an effective method to increase the gasoline yield from crude oil.

Liquefied Petroleum Gas (LPG)

A mixture of C3 and C4 hydrocarbons that is gaseous in normal temperature and atmospheric pressure conditions but can be liquefied by increasing the pressure or lowering the temperature, enabling it to be transported and stored. The most common types are propane and butane.

Liquefied Natural Gas (LNG)

Liquid that results when natural is cooled to approximately −160ºC at atmospheric pressure. LNG's volume is approximately 1/600 of the volume of natural gas, making it more efficient for transportation.

Hydrocracking

A cracking process that uses hydrogen in the presence of a catalyst to convert heavier fractions of hydrocarbons that have higher ebullition levels and are less valuable into lighter and more valuable fractions. The presence of hydrogen allows the fractions to operate more selectively and at lower temperatures, thus yielding higher returns. The products resulting from this process are saturated compounds with significant stability characteristics.

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