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Idea and Project Portfolio Management for Innovation in a SaaS Company

Margarida Dias Vasques

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Supervisor at FEUP: Professor Doutor João Claro

Supervisor at Company: Dr. Ivo Pereira

U.PORTO

FEUP FACULDADE DE ENGENHARIA UNIVERSIDADE DO PORTO

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“Even though he was built to see the world this way, he was also built to disregard, to be free of the way he was built to see the world.”

-A Private Gaze, Leonard Cohen

Abstract

Innovation is becoming a standard practice in companies, being vital to build competitive advantage and sustain Research and Development (R&D) activities. Despite its growth in the last decades and the fact that it has become more and more utilized on an organizational level, innovation is still difficult to manage throughout its different stages. In fact, innovation's unpredictable ever changing nature and its intangibility make it especially hard to create and develop unequivocal methods for managing and measuring and, consequently, taking advantage of the innovative efforts. Innovation in technological companies is particularly interesting, considering the outcomes are not always tangible, especially in a Software-as-a-Service (SaaS) company. In that sense, the generic goal of this project was to understand how these types of companies work regarding Innovation.

In order to perform this study, the work was developed at a SaaS company focused on marketing automation. Over the last few years, the company has experienced an exponential growth related to company size and R&D efforts. A Research & Development and Innovation (RDI) department was created in order to sustain the needs of the company. Currently, the organization is focused on obtaining the NP4457:2007 certification. This Portuguese Norm allows companies to structure and manage their innovation efforts through a series of requirements, and it was at the center for the innovation management studies pursued throughout the work developed.

The two main topics studied were project portfolio management and idea portfolio management, all related to RDI. Concerning RDI project portfolio management, the goal was to understand how to organize it internally in terms of documentation and storage. For this purpose, several documents and a project repository were created to fulfill documentation and storage needs. Regarding RDI idea portfolio management, the goal was to establish an idea evaluation method; additionally, other actions were developed in order to compliment this goal. For this purpose the idea process was created and detailed by establishing a single submission location, as well as a submission form, an idea screening moment and by creating an idea evaluation tool. All data was collected through observation, interviews and document revision.

From this study it is possible to recognize the growing importance of Innovation while simultaneously acknowledging the associated difficulties surrounding its management. Specifically in the cases of project and idea management inside Innovation, the goal is to continuously improve and evolve the processes in order to attain more efficient and effective solutions.

Keywords: Idea Evaluation, Idea Portfolio Management, Innovation Management, Innovation, Project Portfolio Management

Resumo

A Inovação está a tornar-se uma prática padrão nas empresas, sendo vital para construir vantagem competitiva e sustentar as atividades de Investigação e Desenvolvimento (I&D). Apesar do seu crescimento nas últimas décadas e de se ter tornado cada vez mais utilizada a nível organizacional, a Inovação ainda é difícil de gerir nas suas diferentes etapas. Na verdade, a natureza em constante mudança e imprevisibilidade da Inovação, bem como a sua intangibilidade tornam especialmente difícil criar e desenvolver métodos inequívocos de gestão e medição e, consequentemente, tirar proveito dos esforços da Inovação. A inovação em empresas de tecnologia é particularmente interessante, considerando que os resultados nem sempre são tangíveis, especialmente numa empresa de SaaS. Nesse sentido, o objetivo deste projeto foi compreender como funcionam estes tipos de empresas no que diz respeito à Inovação.

Para a realização deste estudo, o trabalho foi desenvolvido numa empresa de SaaS com foco em automação de marketing. Nos últimos anos, a empresa experienciou um crescimento exponencial relacionado com o tamanho da empresa e com os esforços de I&D. Um departamento de Investigação & Desenvolvimento e Inovação (IDI) foi criado para atender às necessidades da empresa. Atualmente, a organização está focada na obtenção da certificação NP4457:2007. Esta Norma Portuguesa permite às empresas estruturar e gerir os seus esforços de inovação através de um conjunto de requisitos, e esteve no centro dos estudos de gestão da inovação prosseguidos ao longo do trabalho desenvolvido.

Os dois principais tópicos estudados foram gestão do portfólio de projetos e gestão de portfólio de ideias, todos relacionados com a IDI. No que diz respeito à gestão do portfólio de projetos de IDI, o objetivo era compreender como organizá-lo internamente em termos de documentação e armazenamento. Com este propósito, vários documentos e um repositório de projetos foram criados para atender às necessidades de documentação e armazenamento. Em relação à gestão do portfólio de ideias de IDI, o objetivo foi estabelecer um método de avaliação de ideias; adicionalmente, outras ações foram desenvolvidas para complementar esse objetivo. Com este propósito o processo de ideias foi criado e detalhado estabelecendo um único local de envio, bem como um formulário de submissão, um momento de triagem de ideias e criando uma ferramenta de avaliação de ideias. Todos os dados foram recolhidos através de observação, entrevistas e revisão de documentação.

A partir deste estudo é possível reconhecer a crescente importância da inovação, reconhecendo simultaneamente as dificuldades associadas à sua gestão. Especificamente nos casos de gestão de projetos e ideias dentro da Inovação, o objetivo é melhorar e evoluir continuamente os processos de forma a obter soluções mais eficientes e eficazes.

Palavras-chave: Avaliação de Ideias; Gestão da Inovação; Gestão do Portfólio de Ideias; Gestão do Portfólio de Projetos; Inovação

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List of abbreviations

BAPA – Brand Ambassador and Product Advocate

CIP – Closed Innovation Paradigm

FEUP – Faculty of Engineering of the University of Porto

HR – Human Resources

IC – Innovation Cycle

OIP – Open Innovation Paradigm

R&D – Research and Development

RCA – Root-Cause Analysis

RDI – Research, Development and Innovation

RDIMS - Research, Development and Innovation Management System

ROI – Return on Investment

SaaS – Software-as-a-Service

SME – Small and Medium Enterprise

1 Introduction

This dissertation was developed for the conclusion of the master's degree in Services Engineering and Management at the Faculty of Engineering of the University of Porto. The goal of this document is to present a case study developed in the area of Innovation at a technological Portuguese company dedicated to developing marketing automation solutions through a SaaS platform.

This section aims to introduce the developed project. Firstly, the project description is presented, with a brief and general explanation of the work developed, followed by the company's presentation - where the Research, Development and Innovation (RDI) department is introduced as well, alongside a mention of the internal information and communication system and the current idea management method. Afterwards, the research objectives are synthesized and, lastly, the structure of the dissertation is presented.

1.1 Project Description

Software companies have become progressively more invested in optimizing processes and sophisticating work methods. Over the past few decades there has been amplified interest in the condition of Small and Medium Enterprises (SMEs), especially in software development, related to RDI (Koc, 2007). This context for innovation management is at the center of the presented work. As it will be possible to see later on, the field of innovation and the efforts regarding innovation management have been exponentially growing in the past decades (Rajapathirana & Hui, 2018). Especially in connection to industrial and technological advances, companies have been trying to find ways to be innovative and sustain Research and Development (R&D) work in order to differentiate themselves (OCDE, 2013). This is the reality of the company in which the project was developed.

E-goi has had an exponential growth in both size and business. The Research, Development and Innovation (RDI) department was created recently in order to fulfill the research and development needs of the company, while sustainably helping the internal processes as well. Therefore, since the department is still growing, there is a need to appropriately organize, store, manage and communicate information regarding innovation. This project is focused on optimizing innovation processes – particularly in a SaaS company. Therefore, innovation management is addressed, specifically regarding the RDI projects portfolio management and, inside the idea management portion of the innovation management process, idea evaluation and flow are explored as well.

1.2 Overview

1.2.1 Company Presentation

E-goi is a Portuguese company started in 2008 and headquartered in Matosinhos. The company, which owns a platform that is named E-goi as well, allows its customers to manage digital marketing. The company operates on a SaaS business model, supporting an omnichannel marketing automation platform and integrating several communication channels such as E-mail, SMS, SmartSMS, Voice, Push and WebPush. One of the main components of the platform is automation, which allows the creation of intelligent marketing campaigns, enabling clients to manage their needs in regard to digital marketing activities. Their mission focuses on creating a solution for effective communication with adaptability to any

organization (regardless of type, business model, dimension or location). The company's formal structure is presented in Figure 13 (Appendix A).

1.2.2 The RDI Department

The RDI Department focuses on many aspects, dividing the responsibilities in different teams:

Internships: Responsible for creating, arranging and developing project proposals, and receiving and accompanying the interns' integration within a department and team inside the company. Many interns are taken in every year in other to carry out studies and develop projects inside the company that are understaffed or that are new and require a deeper understanding, matching the quarter and year's strategic goals set by all departments.

Innovation Management: Responsible for managing innovation in the company. Additionally, the Innovation Management team is responsible for submitting applications in order to receive financial support from different types of funds. Currently, the "Sistema de Incentivos Fiscais à Investigação e ao Desenvolvimento Empresarial" (SIFIDE) application is being done internally, and it encompasses all projects related to RDI. This information is being thoroughly collected and documented, considering these projects have high-priority status (there are legal impositions – connected to time and results – in order to receive these funds).

Artificial Intelligence: Responsible for researching and developing Artificial Intelligence solutions for E-goi's customers, inserted in the "Núcleo I&D" project (created in September of 2019). The goal is to generate new knowledge regarding Artificial Intelligence, Machine Learning, Intelligent Marketing and One-2-One Marketing, and currently there are 4 projects being developed in this field.

BAPA (Brand Ambassador and Product Advocate): Responsible for inserting E-goi into courses that teach marketing in higher education institutions or schools, allowing students to interact, learn and use the service platform. This entails creating partnerships and establishing contacts with institutions both nationally and internationally. The team is currently focused on expanding the brand and generating visibility in Spain and Latin America. Throughout the years, E-goi has consolidated a space in the Portuguese market, while expanding on an international level, largely in Spain, Brazil and Colombia.

1.2.3 Information and Communication System

In order to easily function on a day-to-day operation and to facilitate communication, scheduling and information storage, E-goi has an internal platform named "Bitrix"[1]. This platform is available to all employees and allows a dynamic flow of communication, activities, responsibilities and requirements. The main page is composed of a feed at the center with a search bar for any keyword (relates documents, messages, people and others), a list menu with applications on the left, a chat system on the right menu, a function to clock in and out, a function for the personal data, alongside a notification and a help button. The left menu is filled with relevant topics for important day-to-day activities (calendar, workflows, tasks, drive, knowledge base, services, employees and others), and the chat menu allows for easy communication at all times.

[1] Platform created by Bitrix24 (https://www.bitrix24.com)

1.2.4 Idea Management

In terms of idea management, there are three main locations in Bitrix for idea suggestion:

1. Services Menu

Any employee can submit an idea, which afterwards will be read and commented on by other employees. These ideas are usually connected to modifications of current services, actions or methods, or innovations. The location for idea submission is found on the left menu, in the "Services" Function.

2. "E-Balcão"

This location consists of a submission through a workflow directly to Human Resources (HR). Here, a proposition is made to alter or add specific changes to administrative and organizational aspects, later reviewed and analyzed by HR.

3. E-goi Community

This is an idea submission done by E-goi's customers. In this case, while clients use and experience the service and platform, all ideas, suggestions and improvement proposals are welcome through this location.

Additionally, inside each department and between them there are different methods of communication regarding suggestions and ideas: from a suggestion/ issue creator between two departments, to an Excel file shared between all departments (in which departmental needs are passed on).

1.3 Research Questions and Objectives

Having contextualized the project, and by understanding the company it is hosted in, there was a need to set the motivation for the project by explaining the objectives and defining the research questions that are going to be studied.

The goals of this project are set on understanding how innovation works at a SaaS company and how innovation efforts can be optimized in order to improve performance. Particularly concerning RDI projects, the objective was to understand how they are managed internally in terms of documentation and storage, addressing the project portfolio management. Additionally, concerning RDI ideas, one of the main objectives was to try to find ways to describe the process they go through and improve it, thus finding a method to better manage an idea portfolio. Specifically, in the idea management process, the main goal was to find a way to accurately evaluate ideas.

Taking these objectives into consideration the Research Questions proposed to sustain the project's development are:

RQ1 - How to redesign the management of RDI project's documentation when implementing an innovation management framework in a SaaS company?

RQ2 - Which criteria and priorities are emphasized, and how can they be incorporated, in an idea evaluation tool for an innovative SaaS company?

1.4 Dissertation Outline

This dissertation is divided into seven chapters.

This first section encompasses a contextualization of the work done: it briefly showcases the project in question and introduces an overview of the company in which it was developed.

Additionally, the objectives for the development of the project and the subsequent research questions are presented.

The second chapter consists of the literature review, which comprises an in-depth analysis of the topics studied and worked on during the project. The main addressed topics are Innovation, Creativity and Ideas, and Information and Knowledge Management.

In the third chapter, the problem characterization is presented: this part relates to the current issues and needs of the company regarding innovation, which constitutes the foundation for analysis and problem resolution.

After the problem identification and characterization, there is a need to explain the selected approach and how the work was developed; for this purpose, the fourth chapter describes the methodology used.

The fifth chapter provides a view of the results obtained from the analysis made and, simultaneously, showcases some proposals for addressing the encountered problems.

Lastly, the sixth chapter details the conclusions taken from the work developed and allows for conjecturing regarding the future research needs and work recommendations.

The workplan with the main focus points can be summed up as it is represented in Figure 1.

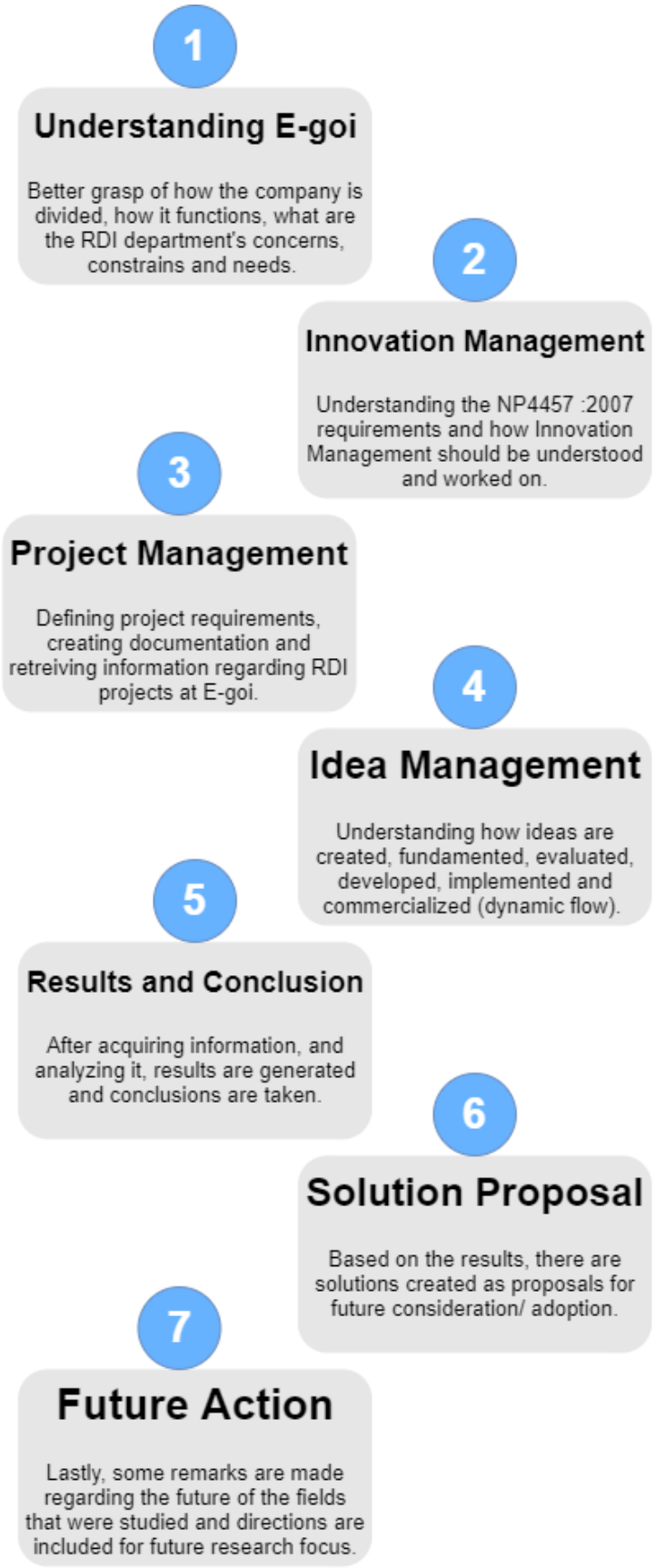


Figure 1 - Workplan Process

2 Literature Review

This chapter explores and analyzes the existing literature around the themes which supported the development of the dissertation. It addresses Innovation and its definition, alongside its Classification, Types, Stimulation and Barriers, and Innovation Management.

Following this theme, it focuses on the closely related field of Creativity and Ideas, which comprises an overview of Idea Management and Idea Management System Models, as well as Idea Evaluation.

Lastly, it reviews the concepts of Knowledge and Information inside the Innovation field, in which are included Information Management notions and a brief examination of the concepts of Information Storage, Access and Linkage.

2.1 Innovation

Due to the emergence of the knowledge economy, global rivalry, technological advancements and rapid growth of the number of countries and companies that consistently invest on R&D activities, Innovation has become a vital aspect for firms (OCDE, 2013). It has been acknowledged by both academia and industry as a crucial factor for acquiring competitive advantage and for sustaining the competitiveness and growth of organizations (Rajapathirana & Hui, 2018).

The concept of Innovation has evolved throughout the years and it is still complex to ascertain a single unequivocal meaning to it. Schumpeter is praised for his many contributions in the field of Innovation, especially for the visibility he created for establishing technology as a critical factor to boost economy. Innovation is characterized by Schumpeter as being the force behind global changes, installing in companies the need to differentiate themselves and seek exclusivity (Varella, Medeiros and Silva Junior, 2012). His theory supports the argument that a real economic growth is only achievable when, the so called “innovations” emerge. In his work, initially in the 1920s, Schumpeter refers to the concept as “new combinations”; however, later on there is a shift and the term “innovation” begins to be used (Bazhal, 2016). Innovation is understood as a successfully commercialized new idea. It is also viewed as the implementation of a new or significantly improved solution for which the goal is to strengthen competitive advantage and improve performance or knowledge (COTEC, 2007). This practical perspective is made evident in the Oslo Manual, when it is stated that an innovation requires implementation (OECD, 2018). From an organizational point of view, innovation can be generically represented as being a set of ideas, practices or artifacts that are perceived as novel and pertinent, with implementations and outcomes that result in gains to an organization, considering that it will not happen if any one of these elements is not present (Escalfoni, Braganholo and Borges, 2011).

Some authors establish a closer relation between the concepts of Innovation and Creativity. In 1998, Peter Cook stated that companies where a culture of Creativity and Innovation is developed get benefits far past direct sales and end up profiting in other areas such as teamwork, social benefits and employee motivation. He concluded that Creativity can be seen as an opening for the innovation process, inherently linking these two concepts. From this viewpoint, innovation has been defined as “the purposeful and organized search for changes” (Drucker, 1985) or “any idea, practice or material artifact perceived to be new by the relevant unit of adoption.” (Zaltman, Duncan and Holbeck, 1973). Interestingly, Kanter (1983) defined

innovation as “the process of bringing any new, problem solving idea into use. (…) Innovation is the generation, acceptance and implementation of new ideas, processes, products, or services”, which allows for a comprehensive understanding of how an idea can generate a new solution and then be implemented. Kanter also explains that, since an idea can come from any part of an organization, it can be exploited both for commercial purposes and be implemented and exploited internally as well. Innovation is also acknowledged as having a cross-disciplinary orientation, which entails studying it from varied points of view. Since no one single discipline handles all facets of innovation, there is a need to combine perceptions and understandings from multiple different disciplines.

2.1.1 Classification of Innovations

Throughout the literature there have been many classifications suggested for innovation. Several studies converge on the notion that there are four broad innovation pillars: Incremental (continuous and exploitative), Radical (discontinuous and explorative), Ambidextrous and Disruptive Innovations (Benner & Tushman, 2015).

Incremental Innovation stands for the continuous improvement of products/ services or processes that are already known (exploitative) and it often occurs in short periods of time, conveying more than 50% of innovations. However, they do not account for even a third of firms’ innovation profits, meaning solely Incremental Innovation does not allow companies to achieve sustainable competitiveness (Lee & Trimi, 2018).

Conversely, Radical Innovation, as defined by Benner and Tushman, comprises the exploration of the unknown (explorative), and includes new ideas and inventions, new products or services, processes, patents, business models and others. Consequently, it is characterized by lengthier periods of time, especially with R&D, prototyping, trials, testing, certifications, and other activities. Freeman defined Radical Innovation as being the result of R&D activities that produce new products, processes or organizational variations, stating that it ruptures preceding technological structural patterns, which leads to new markets, sectors and industries. By investing and exploring, most firms tend to seek to be the first creators of something new, since it provides the opportunity to offer a novelty to the customer, act as (temporary) monopolists and generate a new range of foreseeable profits (Kim & Mauborgne, 2005) (Rubera & Kirca, 2012) (Tiberius, Schwarzer & Roig-Dobón, 2020).

Ambidextrous Innovation aims to develop dynamic aptitudes in order for organizational strategies to be consistent with the ever-changing market conditions, while incessantly improving its prevailing competitive advantage. This solves the strategical issue of defining how to balance Incremental and Radical innovation in organizations, without having to sacrifice either, or the firm’s core capabilities (Lee & Trimi, 2018).

Lastly, although Disruptive Innovation is considered a complex concept, one of its rudimentary notions is that organizations tend to overfill their markets with new technological advances for the mainstream customers, which leads to the creation of a market for novices that can potentially take over the usual market leaders. It has also been defined as a type of innovation which stimulates the creation of new markets, industries or businesses, yielding a new concept of product/ service (and, consequently, its value), overriding the current market (Rahman, Hamid & Chin, 2017).

2.1.2 Innovation Types

Initially, Schumpeter began by distinguishing types of innovation into five different categories: (1) new products, (2) new methods of production, (3) new sources of supply, (4) exploitation of new markets and (5) new ways to organize business (Varella, Medeiros and Silva Junior, 2012). The interpretation of the different types of innovation has changed through time, mainly due to technological advances, industry changes and the emergence of Disruptive Innovations. According to the Oslo Manual, innovation may manifest itself on various levels, transforming or materializing ideas into improvements as an organizational, process, product/ service and marketing novelty which is valuable. Hence, there are four types of innovation:

1. Organizational Innovation, pertaining to the implementation of new organizational methods in business practice, organization of work and or external relationships;
2. Process Innovation, by implementing new or significantly enhanced/ improved processes, logistics and distribution;
3. Product or Service Innovation, consisting of introducing in the market new or significantly enhanced/ improved products or services;
4. Marketing Innovation, which encompasses the implementation of new marketing methods, involving significantly enhanced improvements in product or packaging design, price, distribution and promotion.

The Oslo Manual also distinguishes between two important types of innovation by object: Product Innovation and Business Process Innovation. The Business Process Innovation is defined as a new or significantly improved process that will take effect on one or more business functions and that will be implemented once it is brought into the firm (in both internal and outward-facing operations). Implementation usually occurs when the business process is used on an ongoing basis in the firm's operations (OECD, 2018). This distinction is important because the same idea can encompass a mix of different types of innovation. In that sense, an organization is advised to collect information on various types of Innovations, for it may help respond differently to distinct Innovations (different Innovations, each with a different typology) or one with multiple types of innovation (combining more than one innovation type). Therefore, the division between types of innovation by object sustains the possibility of it not being mutually exclusive.

2.1.3 Innovation Management

When it comes to business, the ability to innovate is a requirement to assure competitiveness. Innovative organizations usually work on new Innovations that will eventually replace older ones, which is relevant since there is a reduced growth for older Innovations. Companies tend to create far more technical innovations than they can possibly hope to effectively develop and commercialize, which is why there is a need for structured management and processes to handle innovation (Downey & CIMA, 2007). In that sense, managing innovation is essential, since it allows for the systemization and organization of information, knowledge and creativity through the clarification of organizational responsibilities and the monitoring and developing of innovation processes (COTEC, 2007).

According to the Oslo Manual (2018), Innovation Management includes "all systematic activities to plan, govern and control internal and external resources for innovation", while also involving activities for setting policies, approaches, purposes, processes, structures, roles

and responsibilities to handle an organization's innovation (including tools and ways to analyze and evaluate them). Innovation Management practices are relevant to innovation-active firms, although the degree of formality and the complexity of these practices can differ considerably between companies. According to Downey & CIMA (2007), Innovation Management is the process of managing innovations in organizations through the stages of the Innovation Cycle (IC). The IC describes the activities involved in taking an innovative product or service to the marketplace. In this proposal, there are 9 stages identified:

1. Ideation - this first stage in the innovation cycle regards idea generation, which can arise from observation of a current or future problem or be inspired by the organization's goals, which usually results in identifying a market opportunity.
2. Resource identification – this stage is concerned with recognizing if people, finances, tangibles and facilities match the goals of the organization.
3. Investigation – this phase is based on researching the possibilities and understanding the spectrum of capability in order to further develop the idea.
4. Patenting and Registering – this stage may not always occur but is has become increasingly vital to protect intellectual property when needed be.
5. Designing – this stage focuses on modeling, prototyping, testing and evaluating what is being created for users.
6. Development – is mostly concerned with improving the technology. Sometimes an organization might wait at the end of the development phase for suitable market conditions.
7. Making - Start production.
8. Selling – Focusing on advertising and informing the market/ targeted audience.
9. Service – Finally, the last stage comprises the communication with the customers.

These final stages of commercialization (Selling and Service) where the innovation is advertised and sold to the customer are the toughest stages of the IC for companies to manage. At this time it becomes crucial for the organization to monitor the innovation's performance in order to make corrections or improvements (Downey & CIMA, 2007). Studies have also tried to ascertain the several dimensions and correspondent criteria and their relevance that are inherent throughout the Innovation Management Process. A study conducted to better understand Innovation Management practices, their strategic adaptation and its business results stated that the main Innovation Management patterns revolve around: Innovation Strategy, Innovation Management Systems, Innovation Culture, Creativity, Project Management, Product Innovation, Process Innovation and Commercialization (Sánchez, Lago, Ferràs &Ribera, 2011).

2.1.3.1 Innovation Management Process Models

Innovation Management should be supported by the pursuit of installing accurate and appropriate policies in order to safeguard the cohesive development of the Innovation Culture. According to Şimşit, Vayvay and Öztürk (2014), the first steps should comprise and in-depth analysis of the state of the organization (resources, internal processes, etc.) in order to establish metrics and approaches (so as to change the current functioning, or to adapt it to the new requirements).

There is a reasonable agreement throughout the literature over the chronology of the existing models (or frameworks), as they are divided by 6 generations: Technology Push, Market Pull, Coupling Model, Interactive/ Integrated Model, Network Model and Open Innovation. The 1st Generation (Technology Push) includes innovation models dated back to the 1950s, which were linear and treated innovation in a sequential process that took place in small and simple stages. The 2nd Generation, acknowledged as Market Pull (also a linear model), surfaced in the late 1960s and was given this designation since studies were beginning to link innovation processes with market theories, showcasing the role of market research in recognizing and fulfilling customer needs, investing R&D funds towards these needs (Şimşit, Vayvay & Öztürk, 2014).

The 3rd Generation models are known as Coupling Models; these models recognize the influence of technological capabilities and market needs in how the innovation firm operates (Preez & Louw, 2008). This generation is characterized by viewing innovation as coupling of science, technology and the marketplace. This generation, contrary to the first two presented, has sequential models with limited functional integration (Şimşit, Vayvay & Öztürk, 2014). A very well-known example for this generation is the Stage-Gate model, created by Cooper in 1990 (Figure 2). This model establishes gates throughout the Innovation Process stages, where evaluators and decision-makers must assess the results up until that time and ponder whether to continue the project, or let it go.

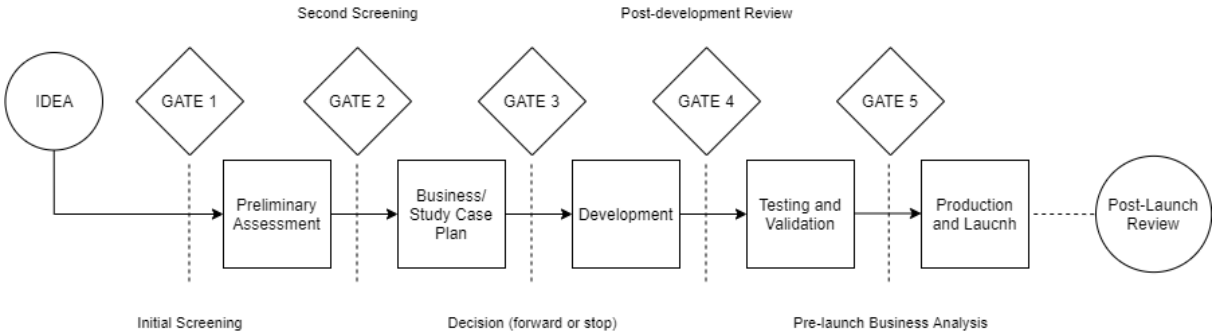


Figure 2 - 3rd Generation Innovation Model – Stage-Gate Model Example (based on Cooper, 2002)

The 4th Generation Models are known as Interactive or Integrated Models. They are combinations of the first two generations, and they focus on external connections in order to improve the lack of functional integration previously present; this approach considers the Innovation Process as parallel actions across organizational functions (Preez & Louw, 2008). In regard to the 5th Generation Network Model, innovation is seen as "a distributed networking process based on corporate alliances, partnership, joint venture and government funding" (Şimşit, Vayvay & Öztürk, 2014). New products/ processes and their marketing happened within the company's boundaries, and the development of ideas was done internally and in secrecy, allowing for innovation to happen only within a network of internal and external stakeholders. 5th Generation models are seen as closed networks of innovation, which means a company will create, develop and launch its own idea; this concept is called the Closed Innovation Paradigm (CIP).

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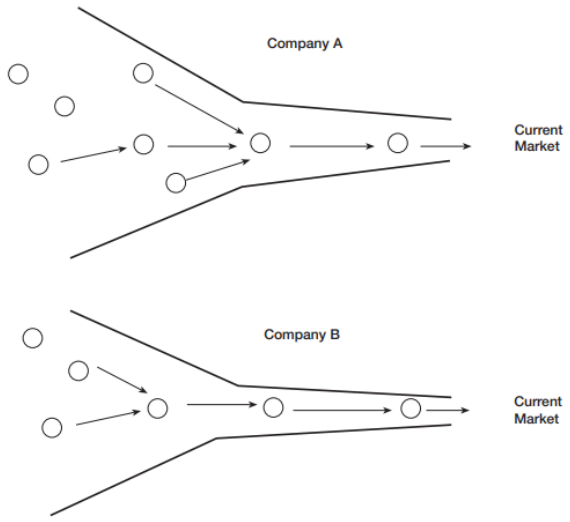


Figure 3 - The Knowledge Landscape in the Closed Innovation Paradigm (Chesbrough, 2003)

Closed Innovation stands for the ideation and construction of innovation within the company, restricting information, ideas and knowledge to a "bubble" (the firm's collective data), resorting, at times, to maintaining developments in secrecy (Figure 3). This type of thinking began in the 1990s, in an attempt to support and explain the innovation progress and growth, the industrial changes and the disruptive technologies emerging in different industries, offering a "self-reliance philosophy", powered by R&D actions (Chesbrough, 2003).

From this point forward, according to Chesbrough (2003), innovation experienced a shift of paradigm. The known form of exploring and exploiting knowledge has been put in question considering the developments and advances of the 21st century. The shift in paradigm is based on a different knowledge landscape, creating a new logic of openness, collaboration and knowledge-sharing, which is explained by a different rationale of idea sources and how they are perceived and shared (Chesborough, 2003). 6th Generation models are also network models of the innovation process, which allows for an exploration of the linear and coupling models combined, shifting its characteristics to better fit the needs/ requirements at hand. Following the new open and knowledge-sharing logic, there is a combination of internal and external ideas and pathways to the market, in order to advance the development of new technologies (Figure 4).

This new way of looking at innovation brought many benefits, mainly the fact that Open Innovation allowed for a much larger base of ideas and technologies from which companies could research, develop and produce, specifically tailored to their capabilities and their market needs. In return, this led to internal growth and knowledge sharing (from both absorbing it from the external environment and releasing new knowledge from the inside of the company into the external environment as well). Additionally, this new mind-set brought fewer risks associated with RDI investments, considering knowledge was more diffused than ever and information began to be easier to retrieve (Preez & Louw, 2008). Ultimately, the diffusion of knowledge changed the viability and desirability of a closed innovation approach. With knowledge abundance, ideas come from several different places and RDI investment has been more focused toward an open mindset and a broader perspective towards the needs from both the market and the organization itself (Chesbrough, 2003).

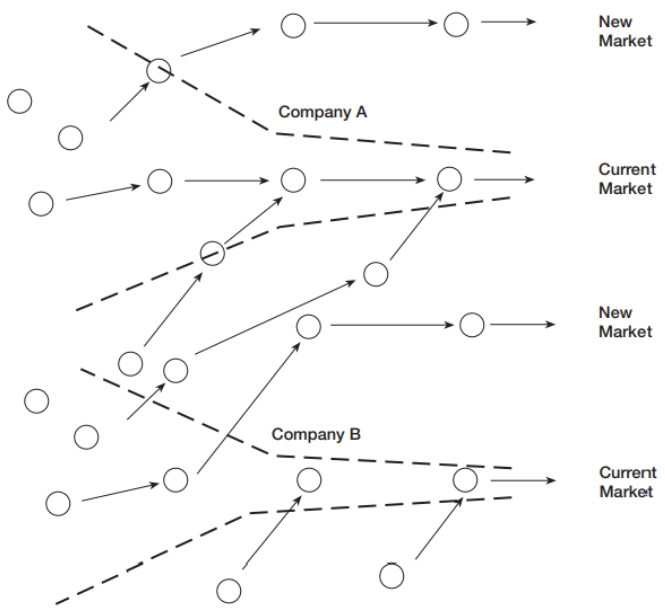


Figure 4 - The Knowledge Landscape in the Open Innovation Paradigm (Chesbrough, 2003)

The covered theoretical basis allows taking some conclusions regarding the innovation process stages and requirements by comparing and combining different characteristics from multiple distinct models. There is not a specific framework for all companies to use; nonetheless, the ultimate goal is to establish guidelines and benchmarks based on each individual company's capabilities in order to exponentiate their innovative abilities and performance.

2.2 Creativity and Ideas

Creativity, as previously mentioned, has been closely related to the concept of innovation. They were intimately and simplistically conceptualized as Creativity referring to the generation of ideas and innovation being the implementation stage (Gurteen, 1998). From an idea standpoint, Amabile (1988) defined Creativity as the "production of novel and useful ideas by an individual or small group of individuals working together". Later on, this initial proposal was expanded, being defined as "the production of novel and useful ideas in any domain" (Amabile, Conti, Coon, Lazenby and Herron, 1996). The following year, the definition was broadened by culminating in the conception of Creativity as being "the production of novel, appropriate ideas in any realm of human activity, from science, to the arts, to education, to business, to everyday life" (Amabile, 1997), making it understood that ideas should be new and match the occasion or issue at hand.

It has been stated that Creativity includes two principles: problem finding and problem solving, and, for this reason, it requires several diverse aptitudes. Thus, "creative thinking is not conventional and involves modifying or rejecting existing ideas" (Herbig & Jacobs, 1996). An important separation within Creativity is based on three types: improving or changing things, combining existing things together and creating something new (Al-Ababneh, 2020). In 1998, Peter Cook suggested in his research that Creativity is an element of competitive advantage. He concluded that Creativity can be seen as an opening for the innovation process, and it occurs through four stages, namely: idea generation, idea screening, idea feasibility and implementation.

2.2.1 Managing Ideas

Idea management constitutes a part of the innovation management process, considered to be a subprocess to attain effective and efficient idea generation, evaluation and selection (Brem & Voigt, 2007) and characterizing Idea management systems as structured processes for generating and evaluating innovation ideas (Sandström & Björk, 2010). Generally, companies cannot put every idea into practice, whether it is for lack of resources, (technology, time, money, and others), or lack of feasibility or relevance; however, many companies cannot sustain researching and developing their ideas because the way they manage them is ineffective. Historically, the traditional system for ideas suggestion was focused on obtaining and developing inventions and not particularly innovations (Gerlach & Brem, 2017). Suggestion boxes, for instance, were frequently used as a way to incite employees in participating in the company's collective efforts to improve and innovate, as well as help organize and manage creativity along these lines (Sandström & Björk, 2010).

As we see innovation grow and become increasingly relevant in organizations, idea management is, simultaneously, becoming a crucial part of corporate management, inserting itself as a pilar in innovation management. Fundamentally, ideas are the power-source for innovation, which means companies that are capable of properly managing quality ideas will, inevitably, become more successful at generating and sustaining innovation. Although it is true that companies which can better manage their ideas may significantly improve their innovation, the generation of ideas alone does not necessarily result in innovative products/ processes, higher revenues or customer satisfaction (Gerlach & Brem, 2017).

The scientific research showcases a significant number of frameworks, created to propose methods for managing ideas. The literature seems to reach an agreement that there are 6 phases in the idea management process (Figure 5): preparation, idea generation (also known as "ideation"), improvement, evaluation, implementation, and deployment (Sandström & Björk, 2010).

The preparation phase encompasses the setup of the idea management program in order to have ideas being submitted in the second phase. The idea generation phase involves the idea submission, in which anyone from the organization environment can participate, followed by the improvement upon those in the third phase[2]. The fourth stage is a vital part of the process since it determines whether the idea will be pursued or dismissed (evaluation and selection). In this phase organizations select ideas for development and focus on ones that are considered promising. However, because evaluators may need to rely on multiple criteria and ponder from several viewpoints, all while facing uncertainties, this is not considered an easy task (Sukhov, Sihvonen, Netz, Magnusson & Olsson, 2020).

[2] The ideas that are submitted should be retrieved and stored in a designated place/ system in order to accommodate for their future improvement and evaluation phases, creating a space for peers to analyze, comment and suggest upon (Gerlach & Brem, 2017).

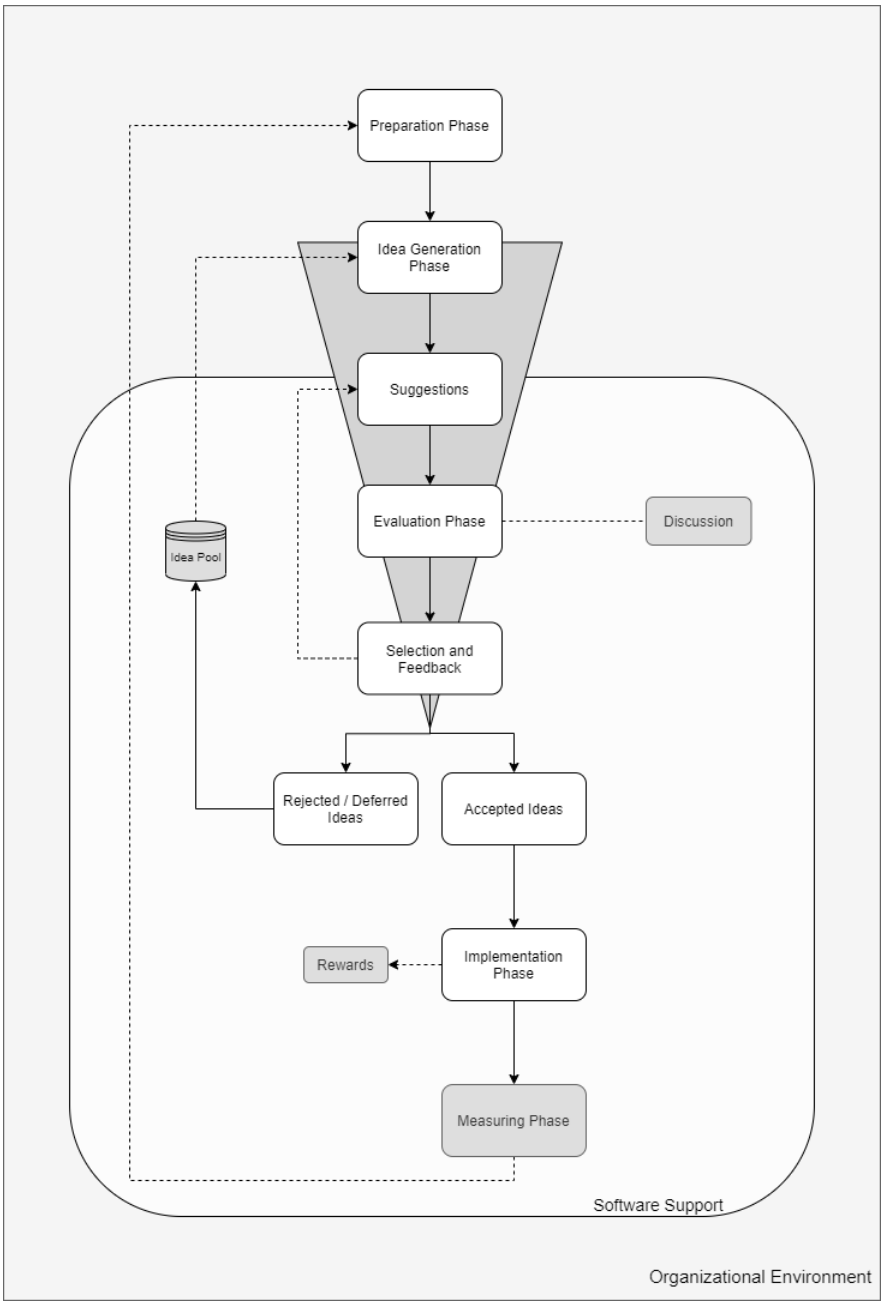


Figure 5 - Generic Idea Management Process (source: Gerlach & Brem, 2017)

Finally, in the sixth phase, the implemented idea is deployed for its target group. After the first stage, ideas should have a specifically designed space for being submitted (Gerlach & Brem, 2017). However, not all submitted ideas will be suited to the organization's purpose and philosophy, for which the improvement and evaluation phases are crucial. The suitability gap may be shortened provided the organization's ability to foster and nurture creativity alongside an innovative culture. According to Gerlach and Brem (2017), the organization should "motivate idea submissions with rewards, ensure a fair evaluation process, and enable idea reflections through a sounding board".

2.2.2 Evaluating Ideas

As previously mentioned, the Evaluation and Selection stage of the Idea Management Process is one of the most complex; although many authors have created frameworks for idea evaluation and selection, there is still a large gap in the literature since ideas have a very abstract, intangible and relative nature. Therefore, "how and what to measure remain unclear

when pre-development projects could change in unexpected and diverse ways" (Dziallas & Blind, 2019). This phase is also incredibly difficult due to the responsibility put on the evaluators; there is a substantial amount of subjectivity involved in the evaluation and selection process, and sometimes there are biases in the results obtained because it is hard to remain impartial in certain aspects. The literature does not convey a common ground on who should be part of the evaluation team, ranging from proposals stating the whole innovation/ idea management team should (Fairbank, Spangler & Williams, 2003), to only considering specific, knowledgeable people (Bakker, Boersma & Oreel, 2006).

The Evaluation and Selection steps involved in this stage are intrinsic to each other, since the evaluation of ideas supports the selection phase. Therefore, there is a specific need to define evaluation criteria in order to provide a fundament for decision-making. However, considering every organization is different (in terms of dimension, focus, goals, resources, needs, nature, timetables, budget, and others) and, even inside the same organization, there can be different levels of importance of ideas, there is no unique comprehensive set of criteria. In an attempt to provide support for the decision making process, some experts identify high quality ideas (ideas that are perceived as good to expert evaluators) by drawing on three theoretical perspectives: intuition, analytical thinking, and sensemaking. These three are not mutually exclusive; however, they focus on different facets of idea screening and how a contribution is made in terms of judging idea quality.

- **Intuition**

Intuitive judgments emerge from broad associations and allow for a non-conscious way to make rapid decisions based on the surrounding environment. Intuition is based on past experiences, which can, sometimes, make the process more partial to the evaluator - what is traditionally known as "gut-feeling" or "hunch". Therefore, intuitive activities are based on the evaluator's skill to form immediate links about an idea's quality, and to make judgments based on it.

- **Analytical Thinking**

Analytical judgements are controlled processes carried out in a reflective moment with rationality and reasoning. Analytical thinking in idea screening involves a framework for determining quality (which can either be created by the evaluators or outlined by the organization itself); it also enables evaluators to better deal with uncertainty. Quality is assessed based on how the idea matches the criteria (this results in high or low quality ideas).

- **Sensemaking**

Sensemaking judgements are based on an interpretive process people make where reasonable and appropriate classifications are created in order to act. Similar to Intuition, Sensemaking resorts to the environment, but for the creation of meaning through cycles of interpretation and action, which generates higher levels of Creativity and idea multiplication.

In an organization, the three theoretical perspectives are commonly used together, since decision-makers tend to appreciate employee's experience in the field (intuition), make use of quality-determining frameworks (analytical thinking) and resort to interpretation and classification in order to act (Sensemaking). From an analytical standpoint, many authors have proposed criteria and distinctions between them in order to provide better and more complete framework options. Some recommend differentiating incremental and radical Innovations, mainly because, since radical Innovations can span out of the company's usual

business or goals, there's a need to contextualize them in a different light, acknowledging them as potential disruptive Innovations (Gerlach & Brem, 2017).

Other authors have stated the importance of treating ideas differently, taking into consideration their nature or type; there is a model proposal that divides technology and business ideas (distinguishing incremental and radical Innovations), in order to contextualize them differently from the start (Sandström & Björk, 2010). The set of criteria presented in the literature is vast, explaining different characteristics that could be considered when evaluating an idea (Table 1).

Ultimately, the framework is meant to help the decision-making process, which means the used criteria should provide a final score of the idea and dictate whether it should be accepted and developed, accepted under conditions, or rejected. Ideally, since the evaluation process can be time-consuming, companies should create evaluation groups or committees to help accelerate the process while bringing different perspectives into frame and providing a broader view on evaluation per criteria (Gerlach & Brem, 2017).

Criteria	Description
Novelty	The degree of newness and paradigm shifting.
Originality	The degree of rarity and differentiation.
Feasibility	The degree of ability to implement and work without constrictions.
Thoroughness	The degree of detail put into the idea conception and description.
Acceptability	The degree of social, legal or political acceptance.
Relevance	The degree of appropriateness in problem resolution.
Use Value	The degree of perceived value by the users.
Adoption Rate	The degree of acceptance and adoption in the market.
Resources	The degree of existence and availability of needed resources.
Competitive Response	The degree of competitive response from the external environment.
Commercialization Costs	The value of the investment needed for commercialization.
Development Costs	The value of the investment needed for development.
Efficiency	The ratio between effectiveness (relevance) and effort (resources).
Revenue Opportunity	The value of return generated by development/ implementation.
Costs and Gains	The value obtained by subtracting the costs to the revenue.
Added Value	The degree of benefit brought by the realization of the idea.
Customer Satisfaction	The degree of customer satisfaction generated.
Risk	The degree of probable danger associated.
Implicational Explicitness	The relationship between the recommended action and the expected outcome.
Completeness	The degree of response to who, what, where, when, why and how.

Clarity	The degree of clear and effective communication of the idea.
Sustainability	The degree of ability to maintain normal/ optimal functioning.
Spillover	The degree of usability of an idea beyond the initial purpose.
Uncertainty	The degree of doubt associated.

Table 1 - Criteria for Idea Evaluation (Sources: Gelarch & Brem, 2017; McGrath & MacMillan, 2000; Sandström & Björk, 2010; Dean, Hender, Rogers & Santanen, 2006; Sukhov, Sihvonen, Netz, Magnusson & Olsson, 2020)

2.3 Information and Knowledge in Innovation

The concept of Information is heavily debated until today. Because different scientific disciplines use it according to their own field of study, many conceptions and consequent interpretations of Information have emerged through time; this also entices the notion that, moving forward, many more will be perceived and created in order to keep up with technical and scientific developments. Most researchers have argued that, because of this phenomenon, information has become an interdisciplinary concept, that cannot be interpreted equally in all its dimensions. For instance, Capurro and Hjorland (2005) contextualize that the current view of Information in "everyday English" is "communicated knowledge", which is crucial to society.

According to the Oslo Manual (2018), information is organized data that can be produced and transferred across organizations at low cost. Information science started to become widespread during World War II due to the use of computer networks and the need to pass on classified information (much through encryption). Since then, information science has become a noticeable scientific field; the rise of information technology has had global impacts in multiple aspects, mainly due to the emergence of technology and the digital domain that has been established. It is this precise notion that creates such an impact on the natural and social sciences, and why information has become such a difficult concept to define, and it is still highly debated (Capurro & Hjorland, 2005).

Information on the object of an innovation is valuable for assessing the goals of the innovation, its characteristics and probable impacts on the organization (OECD, 2018). Knowledge is a specific human process that results from "knowing". The concept of knowledge is as difficult to ascertain as the concept of information. Knowledge is usually described as a justified belief that is true (Bolisani & Bratianu, 2018). Knowledge is of great strategic significance in organizations since it refers to an understanding of information and the ability to use it for different purposes, obtained through cognitive effort (OECD, 2018).

When it comes to innovation in organizations, managing information and knowledge tends to dictate the success or failure of the actions. In fact, innovations derive from knowledge based activities and as previously mentioned, the Open Innovation Paradigm conveys the exchange, diffusion and absorption of knowledge (Chesbrough, 2003). According to the Oslo Manual, innovation-relevant information should be correctly stored, even if there are no applications in mind with the ambition that it may, for example, aid in the development of future actions. Therefore, there is a great concern regarding managing, documenting, storing and accessing information inside the organizations.

2.3.1 Information Management

Information preservation and management represents a real concern to which various organizations and institutions seek to respond (Oliveira & Pinto, 2017). In the second half of

the 1960s, information management was identified as the usage of methods, data and approaches for ensuring engineering efficiency when it came to solving technical and technological activities (Taylor, 1966). In the 1970s, information management was being frequently used in tasks regarding data processing (organizing, documenting and storing information for instance, in libraries). A decade later, information management was referred to when it came to dealing with methods and approaches in any professional field of informatics.

The concern began to shift into finding a way of managing information through a designed system: the ultimate goal of information management was to efficiently process information through an information system. Currently, the Association of Information and Image Management considers information management to be the production, retrieval, dissemination and storage of information in such a way that it is presentable in any format and can sustain the business goals of an organization in the most effective way. In that sense, information management can be understood as the proper usage of resources and methods of information technology and of system approaches for handling informational needs from managers and managerial activities (Vodáček, 1998). The literature reflects a large range of data connected to the conception and development of databases, the storage and retrieval of information or even the economics of information, between the cost of information and its value in the economic information sector (Pinto, 2017). Brian Detlor (2010) identified three perspectives of Information Management: organizational, libraries and personal. The organizational perspective is focused on the management of all information processes, concerning itself with supporting the organization in competitiveness and in the attainment of its strategic goals. There are several information processes connected to Information Management: creation, acquisition, organization, storing, preserving, distributing, using and evaluating.

2.3.2 Information Storage, Access and Linkage

The concept of documenting refers to the creation of space (in a particular format) where information can be recorded and organized; for that reason, the document is in the middle of a communication process and the accumulation and transmission of knowledge, which makes it particularly relevant to information management in companies (Pinto, 2017). Systems that allow for information manipulation should guarantee a way to store and access information; the goal would be that this information could grow and develop alongside the organization and the projects that it entails. Mainly, it would concern the development of project documentation, document retrieval and inventory. In order for this to be possible the method of storage must not jeopardize the information itself and should provide easy access for possible alterations to be made.

Ideally, the Information System should sustain a linkage between information, so that any data can be entered and properly linked to relevant information already stored, as well as making it possible for others to find it. This is also important for the system itself to define relations between items (interdependencies, exclusivity, etc.), and between other pieces of information (whether it may be other documents, people, external resources, etc.) (Berners-Lee, 1990). In regard to finding information, keywords are a common approach; they allow for information to be found, even if its exact storage-place is unknown. However, they constitute a general difficulty regarding the way they are written: two people searching for the same piece of information may have different results while searching for it based on the search word they have used. A way around this in practical keyword systems is to ensure that keywords are registered; by doing this, the search word pool is defined and the probability of

finding information is higher, considering keywords to be groups of words that stand for a concept. Therefore, it is possible to link keywords to documents, posts, files, and others, directly and indirectly (Berners-Lee, 1990).

3 Problem Characterization

After presenting the topics surrounding the work, the focus turned to clearly establishing the problems, issues and concerns inside the company in order to help address them and turn them into opportunities for creating new methods of work and, possibly, growth. For that reason, this chapter encompasses the contextualization of the identified needs and opportunities in order to further detail the constrains, providing a solid foundation to address them, and for consequent improvement proposals.

3.1 Problem Context

As seen throughout the literature, innovation has been widely growing in importance in the world of business and it is a field that still requires further exploration. Specifically in the case of innovation management, there are several facets in need of constant measure and evaluation due to their intangibility and volatility. A company's ability to innovate falls onto its capacity to developing new or improving upon products/ services which are capable to satisfy market needs, its skill to applying appropriate process technologies to produce these novelties, its ability for developing and adopting new products/ services or processing technologies in order to satisfy future needs, and its aptitude to respond to accidental technology activities and unexpected opportunities created by competitors (Adler & Shenbar, 1990). Therefore, an organization that does not have this sort of capabilities may have more difficulties in exploiting and developing innovation, as well as profiting from it.

According to a study performed by the European Commission (1995), there are some factors that delay the adoption of innovation in SME's. Generally, the main barriers identified by companies were the leadership profile (which tended to avert risks), the constant crisis climate that is lived, the resistance to change stemming from human resources, a feeble ability to handle crisis or risky situations, the difficulty in adopting organizational changes and the absence of innovation incentives, financing and funding.

Specifically in Portugal, the main barriers identified by companies are the resistance to organizational change and to the alteration of routines and procedures that have already been sedimented over the years, high costs associated with innovation and, consequently, the lack of financial resources to invest and sustain it and the prevalence of a risk-averse culture (afraid of unsuccess and wasting time, money and resources).

In the specific case of E-goi, at the beginning of this study, the company was focused holistically, in the optimization of innovation processes, and rethinking the way it perceives and acts on in regard to innovation. However, as previously mentioned, the innovation process is not linear. The company required help to structure and organize innovation since, although it has been growing inside the firm, it is still fairly recent and, therefore, is still in the process of systematizing and growing in order to become more sophisticated. For this reason, the innovation management process at the firm has many activities that must be pursued, investigated, implemented, analyzed and evaluated. This need was also made evident since the firm has been working on obtaining its certification of the NP4457:2007 norm. This Portuguese Norm intends to specify the requirements of a Research, Development and Innovation Management System (RDIMS), guiding the organization towards implementing and developing an RDI policy. This norm is applicable to any company, regardless of the sector of activity, complexity and size, as long as the goal is to establish, implement, maintain and improve an RDI management system compliant with the Portuguese Norm. The premise

is that a company should, after implementing the norm's requirements, be able to operate through its innovative potential and perform a self-assessment sustainably and effectively. The NP4457:2007 presents a benchmark to which companies must respond positively, and it is divided into four sections, each specifying the applicable requirements for implementing and certifying an RDIMS:

1. Management Responsibility (which includes RDI policy, responsibility and authority, top management, management representative and management review);
2. Implementation and Operation (composed by RDI management activities, competence, training and awareness, communication, documentation and control of documents and records);
3. RDI Planning (in which are included interface and knowledge production management, idea management and opportunity evaluation and RDI project mapping and planning);
4. Evaluation of Results and Improvements (encompassing results assessment, internal audits and improvement evaluation).

The Framework proposed in the NP4457:2007 is the Chain Interaction Model, a 6th Generation Model that follows the Open Innovation Paradigm, created by Caraça, Lundvall & Mendonça (2009) - Figure 17 in Appendix E. This Model is based on Kline and Rosenberg's Chain Linked Model, adapted to knowledge economy (Instituto Português da Qualidade, 2007).

Particularly in E-goi's case, the focus was to formalize the current work methods, establish new, more effective ones (that provided advantage and bring value), and make sure all the work done so far was uniformized while present and future work is done more strategically and efficiently, sophisticating the RDIMS according to the NP4457:2007's requirements. Since the work involved many different activities and focus points, out of all the possible involved facets, it was imperative to choose between the ones that were needed. Therefore, the choice came down to the RDI Planning section by:

- **Project Management**, by mapping, documenting and managing the company's projects (an NP4457:2007 requirement and E-goi's priority, since the process was not uniformized throughout departments and, sometimes, not occurring at all);
- **Idea Management**, focusing on the idea's flow course inside the company (following a project that had been started the previous year, in accordance with the NP4457:2007) and Idea Evaluation (which was deeply worked on, considering it is an NP4457:2007 requirement and, by observation, data collection and analysis, a non-specified process within the company).

By associating the research questions with the characterization of the problem, it is possible to refine the context and better describe it in order to obtain more clear and straightforward results. Figure 6 illustrates the selection of the intervention areas based on the project's context and the problem at hand.

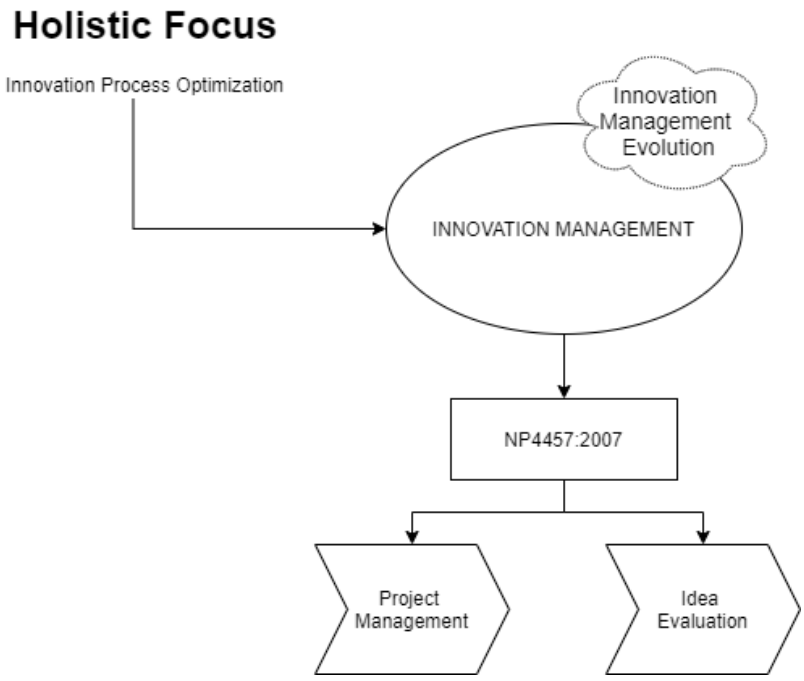


Figure 6 - Problem Context and Intervention Areas

3.2 Project Portfolio Management

Even though some of the best practices have been met, some are yet to be achieved. By observing, analyzing and exploring, it was possible to understand that some of the requirements are not yet met due to specific problems regarding information retrieval and respective storing. Therefore, a root cause analysis was done in order to better grasp the specific aspects in which the company is struggling and should be worked on.

Firstly, in the case of project portfolio management, all of the issues were found to be related to deficits in organization and uniformization of the practices. The company is performing natural and day-to-day operations regarding innovation; however, the activities are not being documented in order to organize information and knowledge. Table 2 shows the two main problems found and their respective causes.

Problem ID	Root-Cause	
P1		Non-uniform documentation
	C1.1	Uneven project documentation
	C1.2	Lack of a uniform project template document
P2		Unorganized information
	C2.1	Lack of project follow-up documentation
	C2.2	Unspecified space for storing project documentation
	C2.3	Lack of linkage amongst information

Table 2 - Root Cause Analysis Identified in Project Portfolio Management Activities

As we can see, problem 1 (P1) concerns the non-uniform documentation that E-goi produces. There are different levels of concern regarding documenting and keeping a record of the activities that are being performed, and projects being developed inside the company. The root cause number C1.1 consists of uneven documentation established throughout the company. Departments have different ways of working and registering relevant information. Mainly concerning projects, this practice cannot be dissimilar in different parts of the company, since the norm states that there should be a common and seamless documentation of the projects in order to function in the same manner. This is intimately linked with root cause number C1.2. The lack of uniform documentation throughout the company raised the following issue: considering not all departments work seamlessly, the ones that actually document their projects still do it in an uneven manner. This is due to the fact that there is not a uniform documentation plan dedicated to project management.

Linked to the first problem comes problem 2 (P2): unorganized information. The different methods of working inside the same company tend to produce different amounts and types of information. However, because there is not a concern for managing it seamlessly, the information is often unorganized and disperse. This can be linked to the fact that there is no documentation to perform a project follow-up (C2.1), there is no single location for storing documentation (C2.2) and, lastly, this information is not linked to other relevant information. This can lead to information loss, extra time spent searching for relevant information and, even when information can be easily found, the fact that it is not uniform leads to information misplacement, information loss and irrelevant information being stored.

These two problems are intricately related. The fact that there is no uniformization leads to an unorganized work environment. In order for an organization to work seamlessly, information management should become a priority. In this particular case, when it comes to innovation, project information should be uniformly stored in order to facilitate the research and retrieval process and allow for less time to be spent searching for information while providing a safe and specialized place for information to be deposited in.

3.3 Idea Portfolio Management

Similarly, in the case of idea portfolio management, there are some requirements that are already being addressed in the company. However, the general environment still presents some less organized and more confuse and inconsistent facets. As mentioned throughout the literature, idea management can be difficult especially in companies with a technology-based operation. Therefore, it is crucial to understand what the difficulties encountered are in order to address and improve on them.

In this case, some of the issues resided in the fact that the current practices are not up-to-date with the norm’s requirements. Some of the methods used are unstructured and can be somewhat confusing. Moreover, there are some inconsistencies regarding the process ideas go through, and the methods surrounding the idea evaluation process. Table 3 demonstrates the 3 main problems found in this context and their respective causes.

As it is possible to see, in problem 3 (P3) there is an evident concern regarding the idea process as a whole. This means that it is still unclear how RDI activities are processed from the moment they emerge up until the moment they are accepted, and an operational strategy is set. Mostly, this is due to the fact that there is no defined or uniform process at the current moment. Ideas travel through an inconsistent process and can become obsolete, delayed or lose value during their journey inside the company. This is one of the root causes of this problem (C3.1). Additionally, during the idea process, there is not a moment for idea triage.

This step is a requirement for the NP4457:2007 since it can serve as a selection instant for ideas that may or may not be pursued in the future, thus reducing the workload surrounding idea management (C3.2).

Problem ID	Root-Cause	
P3	Unclear RDI Idea Process	
	C3.1	Lack of a defined, uniform process
	C3.2	Inexistent method for Idea Triage
P4	Confusing Idea Submission Process	
	C4.1	Non-centralized submission location
	C4.2	Non-uniform submission template
P5	Undefined, Inconsistent Idea Evaluation Method	
	C5.1	Inconsistent method for evaluating ideas
	C5.2	Lack of clear evaluation criteria

Table 3 - Root Cause Analysis Identified in Idea Portfolio Management Activities

Another issue concerning the RDI idea portfolio management is the confusing idea submission process (P4). The idea submission process can have two starting points: idea submission in the Service page and in the workflow submission directly to HR ("E-balcão"). Because there are two idea submission locations for employees, the idea author may have some difficulty deciding on which submission place they should register their idea in. Moreover, HR are focused on dealing with ideas that consist of internal improvements towards the company's functioning. This means that, when an idea is incorrectly submitted, the workload may be doubled since the idea must then be revised and diverged onto the right submission location. Thus, the existence of more than one location for idea submission is a root-cause for the problem (C4.1). Additionally, considering the fact that during the idea submission process there is no single unified template to submit ideas in, information retrieved tends to be inconsistent. Although employees have a common notion of what the submission should entail, there is not a unified and unequivocal idea submission form in which fields are restricted in order to obtain relevant, pertinent and succinct information. This constitutes another root cause (C4.2) for the forth problem.

Lastly, in the idea evaluation stage of the idea process, there is a problem concerning the inconsistency of an undefined method for idea evaluation (P5). According to the NP4457:2007, the idea evaluation process is considered a crucial step for managing ideas; therefore, one of the root causes of this problem relates to the lack of methodology for idea evaluation (C5.1). Additionally, intrinsically related to the lack of method for idea evaluation comes the lack of clear evaluation criteria. Ideas must be evaluated according to set up criteria that best suits the organization's needs, practices and nature. Therefore, the non-existence of criteria constitutes a root cause for this problem (C5.2).

4 Methodology

This chapter is dedicated to explaining in detail the approach to the construction of the study for the developed project. Firstly, there will be a comparison of possible approaches for the development of this work and, secondly, the method used for the project will be further detailed.

4.1 Possible Approaches

Since there are many types of research, different methods for approaching them exist throughout the literature. Therefore, in order to develop this project, different approaches were studied and considered. The logic was based on determining the best qualities from each method in order to be able to appropriately combine them in a way that allowed for a seamless and correct application. The goal was to generate practical value towards the development of the project and the creation of a solution to the problem at hand.

Quantitative Research

This research is based on an empirical investigation deriving from observation and experimentation where all occurrences investigated can be signified in indicators, values, or other types of metrics. Therefore, this type of study is objective, and it is based on analyzing factual truths. This method is grounded on a deductive theory, which goes from a universal, generic declaration or premise, and retrieves and analyzes data in order to obtain a result leading to a logical inference. Through this reasoning, this method can only perceive one reality and one truth (Sale, Lohfeld, & Brazil, 2002).

This approach can have different manners of work, but mostly activities that focus on unbiased observation and strict experimentation (observation and document analysis, correlation between concepts, methodologies, processes and approaches, and others). Some of the most prominent characteristics of the quantitative method are the objectivity of the measurement process and the reliability - due to the use of technology (Steckler, McLeroy, Goodman, Bird, & McCormick, 1992).

Qualitative Research

This type of research is commonly known for having an exploratory nature, and the goal is to provide a description and foundation of a not yet known problem/ occurrence. The qualitative method is founded on subjective inquiries and interpretation. This means that it can assume different and numerous truths based on how the reality is perceived and built, and it is appropriate for developing concepts and determining priorities (Fortin, 2003). In this method, the investigator or group of investigators and the correspondent object of study are always linked, which generates a dynamic interaction between data, results, analysis and conclusion. Therefore, in this perspective, it is possible to have all these different aspects influencing each other and creating new realities and perceptions, which correlates to an inductive approach (Sale, Lohfeld, & Brazil, 2002).

The qualitative research has five methods: narrative, ethnography, grounded theory, phenomenological and case study (Sauro, 2015). Some of the most prominent characteristics of the qualitative method are the subjectivity of the measurement process and the validity – using the evaluator as a self-instrument close to the data (Steckler, McLeroy, Goodman, Bird, & McCormick, 1992).

Mixed Method of Research

Many authors support the notion that the combination of both quantitative and qualitative research methods brings greater advantage to the development of a study. Because they share the same goal, both perspectives hold advantages that, combined, make up for a more complete and invulnerable methodology. The common goal is to provide accurate and correct data in order to investigate, research and solve a given problem, occurrence or phenomena: the quantitative method being focused on verification and oriented towards the outcome, and the qualitative being focused on discovery and oriented towards the process (Steckler, McLeroy, Goodman, Bird, & McCormick, 1992).

Additionally, due to the fact that both methods have compatible characteristics, their combination tends to be very useful while studying complex problems or in studies that entail diverse sorts of data analysis (Sale, Lohfeld, & Brazil, 2002).

Root-Cause Analysis (RCA)

Root Cause Analysis is "a systematic investigation that reviews available empirical and analytical evidence with the goal of definitively identifying a root cause for a failure" (Duphily, 2014). In other words, RCA is a method for observing and understanding the center of a known issue, aiming for the dissolution of the main cause, instead of the broad problem. In order to perform an RCA, it is necessary to establish what the problem is and why it happened.

Design Science Research (DSR)

This method consists of creating solutions for a known problem by taking its artifacts and imposing two design processes and four design artifacts. The design processes consist of building and evaluating. The design artifacts are methods, models, constructs and instantiations. This method uses the premise of a problem solving paradigm (Hevner, March, Park & Ram, 2004).

There are many problem solving techniques that can be used in order to identify the problems of a specific circumstance. The ultimate goal is to reach optimal performance. However, this methodology has been described as too complex because investigators do not have sufficient theoretical basis to analyze, develop and apply the artifacts needed. Research performed on the Design Science premises has been dispersed and inconsistent in different fields, such as management, systems information and engineering (Dresch, Lacerda & Antunes Jr, 2014).

4.2 Method used in the project

This project was developed at an IT company working with a SaaS platform. Therefore, since the project's goal was to solve a problem in a real life situation while providing substance for theoretical studies, this project was based on a case study methodology. As such, the foundation is grounded on analysis and interpretation of the context of the company in order to provide a solution that could be used in similar companies as well (Yin, 2009). In this type of studies it is often seen an application or adaptation of theoretical models, methodologies and techniques into a real functioning company, in order to understand their scope and the ability to provide a solution - by using or adapting them to the reality the project is inserted in (Voss, Tsikriktsis & Frohlich 2002). This method sustains an exploratory premise throughout, which is supported by inductive and deductive approaches at different stages, in order to provide a best suited solution.

Initially, the project was presented as a need for optimizing innovation processes in a SaaS company. At the beginning of the project it was important to understand what "optimizing innovation processes" meant, which led to an investigation of how the company works and what the current shortcomings and difficulties regarding innovation were. By doing so, it was understood that the company was at the beginning stage of implementing a Portuguese Norm, in order to obtain a certification regarding innovation management. The norm – NP4457:2007 – aims at organizing, sophisticating, managing and systematizing the innovation management process inside any type of company, by setting a list of requirements and good practices to follow. Therefore, first and foremost, studying the current situation of E-goi and the plans regarding innovation objectives became imperative.

Additionally, considering the context of the project, there was a need to establish the difficulties and challenges the company faced regarding innovation efforts in a clear and succinct manner. Although the norm registers several requirements regarding different aspects at many stages, project portfolio management was one of the starting points for its implementation. The Portuguese norm also framed the choice for the second activity, although less urgently. There was a need to establish a cohesive RDI idea flow for the company and a method or framework for evaluating these ideas.

Simultaneously, it was crucial to further research the fields involved in the development of the project (innovation, creativity and ideas, and information and knowledge in innovation). This research resulted in the creation of the literature review present in this document (chapter 2), pertaining to Innovation (classification, types and management), Creativity and Ideas (management and evaluation), and, lastly, Information and Knowledge in Innovation (management – storing, accessing and linkage).

By combining the set of discovered challenges and improvement opportunities with the need for following and implementing the requirements of the Portuguese norm, the problems and consequent opportunities were listed in order to be further investigated and worked on. For this purpose, a Root-Cause Analysis (RCA) was used.

After understanding the concepts involved in the project and defining and characterizing the problem, the goal was to recognize how the company itself proceeds compared to the theoretical perspective. Particularly at this time, a deductive approach was used in order to identify opportunities for improvement while understanding the difficulties surrounding the environment and comparing them to the materials found in the literature. Part of this process related to the day-to-day interactions with employees, especially inside the RDI department, mostly concerning RDI project management. However, learning by observation was not sufficient to understand how ideas and projects are viewed and perceived at a company level.

Firstly, regarding the project portfolio management, there was an inherent need to collect information regarding RDI projects in the firm. For this reason, this specific activity was the first one to tackle. All the Department Heads and the CEO participated in a brief presentation of the required information, followed by individual interviews of all involved, in order to retrieve information regarding possible projects from 2020 and 2021 that could be collected and, consequently, stored. Additional interviews were scheduled for further detailing of specific projects.

Regarding idea portfolio management, individual interviews were realized in order to better understand how innovation efforts are seen and work at E-goi, aiming to obtain relevant information regarding how ideas are created, registered/ documented, their natural process inside the company and the best criteria for evaluating them. As seen throughout the

literature, idea management is a difficult process inside innovation management. Therefore, the work started by reviewing the literature in order to find information regarding frameworks and models for idea evaluation and selection. The interviews were prepared based on 4 important steps:

1. Selection of the sample

For this first step, it was crucial to ascertain who to interview. Considering ideas can come from any employee inside E-goi, the goal was to define who would be involved in the process at any point. Surely, the heads of the departments should be included, considering an idea could come either from them or from people they supervise. Similarly, the CEO would also be involved (either by creating the idea, or needing to evaluate it at any point), which meant also being listed as someone to interview. As it is possible to conclude, decision-making personnel were highly involved.

2. Creation of the script

After deciding on who should be involved in the information retrieval process, there was a need to define what information was needed. This stage was based on literature review combined with the understanding of the company and its nature. Therefore, a document was created where the goal was to collect information regarding ideas and how they should be processed and evaluated. The interview script is available in Appendix F.

3. Data retrieval and collection

After defining the topics of discussion and the group of people from which information would be retrieved, it was time to collect data. The interviews were realized throughout 10 days in which all of the selected people were interviewed (9 Department Heads and the CEO). This was done remotely, individually to each interviewed, and in sessions that ranged from 40 minutes to an hour and a half. The set of questions was divided into 2 parts: primarily, open ended questions were asked in order to abstractly obtain information regarding idea submission, idea value and evaluation, ideas' flow inside the organization and the weight given to different evaluation criteria; the second part revolved around presenting a set of close-ended questions, adapted from the literature review and based on the understanding of the company, in order to retrieve information concerning the importance of different factors.

4. Data analysis

Finally, after the collection of data, the interviews must be analyzed in order to take some conclusions. The data was analyzed using a mix of quantitative and qualitative methods (Mixed Method of Research). According to the Oslo Manual (2018), policy makers and users tend to prefer quantitative data for research purposes. However, and as explained throughout the literature, investigating fields such as innovation brings difficulties in analyzing quantitative data, especially due to the fact that some innovation concepts and factors are hard to quantify. Qualitative analysis for innovation studies can be used as a tool for understanding more abstract or subjective answers from the interviewed response set. This method is extremely useful for creating and supporting indicators (for measuring innovation in a later stage). For this analysis, both methods were used throughout the interview, attributing statistics and relating concepts in order to fully sustain results obtained.

After analyzing the interviews and taking some conclusions, the focus was to propose and create solutions for the company. The solutions created and suggested were built on the

NP4457:2007's framework, in order to fulfil the requirements and comply with the certification goal.

Regarding the topics of project portfolio management and idea portfolio management, different solutions were developed, and conclusions were taken from both theoretical and practical points of view. In sum, the methodology can be seen represented in Figure 7.

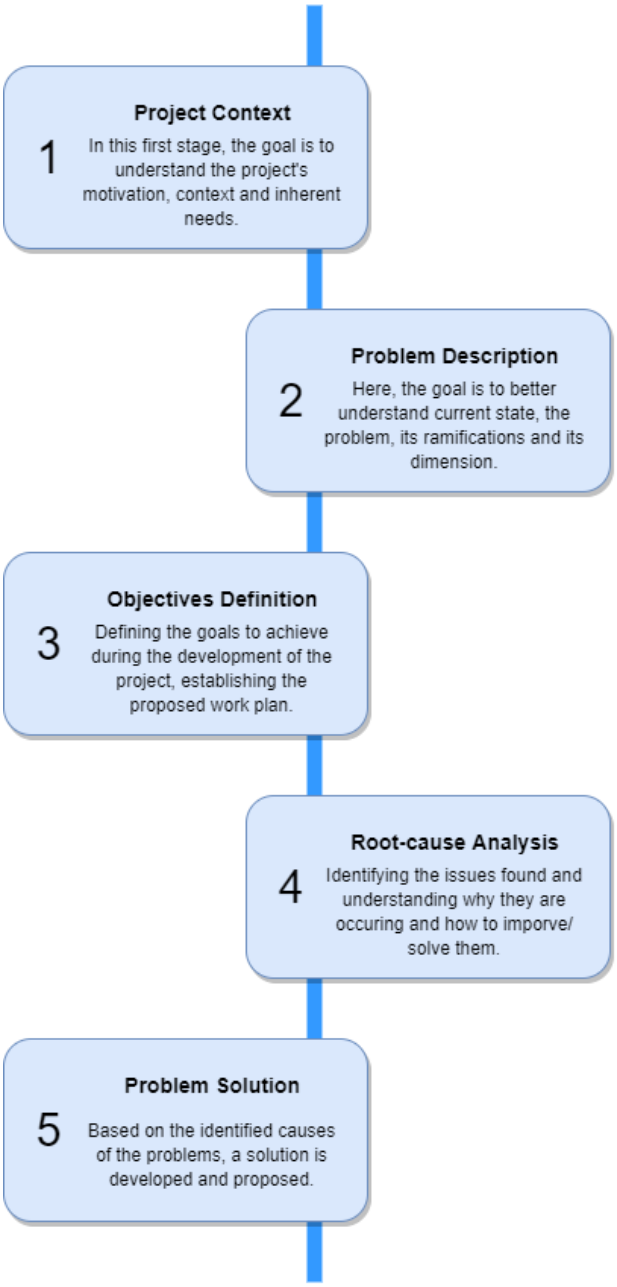


Figure 7 - Methodology Used

5 Results and Proposed Solutions

This chapter presents the results obtained throughout the development of the project. These results were obtained by exploring state of the art surrounding innovation and by analyzing information obtained at the company throughout the duration of the project. Additionally, this chapter also presents the proposed solutions for each of the objects of study. These suggestions are firmly based on the literature review, the analysis of the company's activities and the results found during the study performed. This chapter is divided into two subsections: project portfolio management and idea portfolio management.

5.1 Project Portfolio Management

In terms of project portfolio management, a template was developed to obtain information regarding the company's RDI projects. This template resulted from the analysis of the NP4457:2007's requirements and was developed considering E-goi's communicative and interpersonal nature. The goal was to produce a document that requested the norm's required information and additional relevant information without being too long or too strenuous on the person filling it. An initial draft was created to lay out all the fields needed; then, a review of the document was made by an external consultant, the Innovation Manager and the RDI Department Head, which resulted in a positive feedback with attention to some aspects that needed modification. After implementing the suggested alterations, the goal was to make it less cluttered and more intuitive, so the page design was created, following E-goi's brand guidelines (in terms of formats, design and layout).

Lastly, for this part of the activity, an introduction was made inside the form itself explaining some concepts, notions and requirements for the filling of the document. After the introduction, the document's sections are as follows:

- **Project data** - in which it is asked for a descriptive contextualization of the project, its goals, benefits and expected results, as well as a list to fill with alterations that are made to the document;
- **Methodology** - in which the phases of the project are separated and described, adding how the validation process occurs and when;
- **Allocated resources** - in which it is stated the team members that will be developing the project and their responsibilities, as well as the tangible resources needed for the completion of the project;
- **Additional observations** - in which the revision criteria, selection and result approval are described, and it should be mentioned if there is a need to file for intellectual property protection (patterns, trademarks, etc.).

The final form template is presented in Appendix B.

Subsequently, there was a need to retrieve the information using the form created. For this activity, the Department Heads and the CEO were gathered so it could be explained the norm's requirements, the information that was intended to be retrieved and the main goal moving forward (which was the construction of a repository for all the RDI projects). Secondly, the information began to be retrieved by setting up individual interviews with all the involved personnel regarding projects from the last two to three years that could be considered RDI projects (following metrics set up by the Innovation Manager). Additional

interviews were realized when the head of the department had not been the responsible person for an identified project. In those cases, the person responsible for the project was asked to fill in the form.

The information retrieval resulted in in a spreadsheet containing a list of projects. The main characteristics pointed out in the document are the name of the project, the project type (research and development or innovation), the year it started, the person responsible for it and a notes section for additional information. In this document there is also a link that connects the spreadsheet to the project form (a Google Docs file). The information retrieval process resulted in a collection of 38 projects, ranging from 2020 to 2021. The listed projects were considered because they met the requirements of an RDI project according to the Innovation Manager, which are:

1. Having a duration over three months;
2. Implying an effort of development not lower than one person/ month;
3. Aiming to create or value knowledge, reaching product, process, marketing or organizational innovation;
4. Aiming to resolve an issue or implement a process, product, marketing or organizational improvement.

Out of these 38 projects, 28 were R&D projects, and the remaining 10 were innovation projects, as seen in Figure 8.

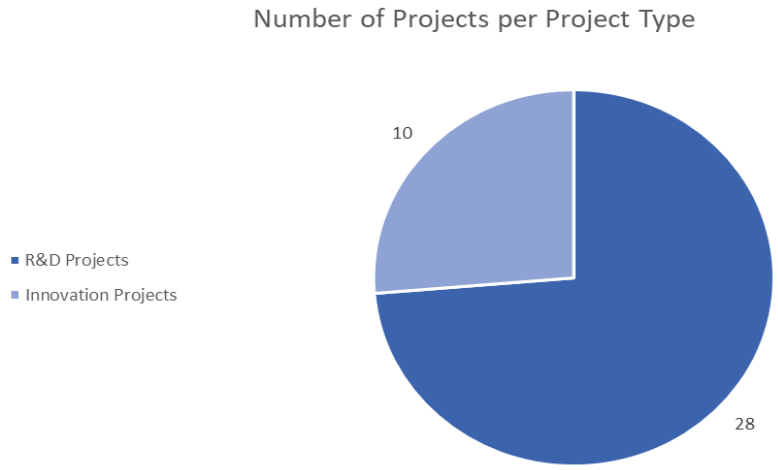


Figure 8 - Project Total by Project Type

Additionally, a second document was created in order to perform a follow-up of the project's development and possible alterations. The goal was to register any changes and developments at least every quarter, allowing for updated documentation and easy access.

This form contains, similarly to the RDI Project Form, a first section pertaining to the project data (project name, the periodical report's number and the time period to which the report refers to) and a description of the work section (description of the RDI activities realized, the results obtained and, if applicable, a critical analysis of difficulties and deviations from the initial workplan). Lastly, there is a field where relevant and necessary documents can be attached or referred to (developed during that time period).

The follow-up form is presented in Appendix C.

Currently, the filled forms of the projects are being stored on a Google Drive folder. However, it is E-goi's goal to be able to store the projects on the internal platform. Therefore, and because there is no current specific location to store the projects in, a proposal of a set of prototypes was developed based on the internal platform of the company, in which a new field on the left menu would be created and named "Projects". This repository would store all projects, keeping them centralized, easily accessible and available for the involved employees to work on (in a document format, directly connected to the Google Docs file).

Additionally, all projects would be available for every employee to consult, in order to create transparency and share knowledge regarding the company's activities. However, since some information may be confidential in certain projects, the fields that should be visible were discussed and agreed upon: title, start and finish date, project context and description, goals and impact, and the team involved in the project development. The access for editing the information would be limited to the people directly involved in the project and the CEO, allowing for a safe environment in which information is always accurate and updated. These editions would be possible every quarter, in which a new follow-up form is filled and stored, allowing for the update of the project. The mock-ups for this proposal are on Appendix D, and they consist of three different pages:

1. **Main Projects Page**

This is the first page where any employee is able to search for any project. This allows filtering the search by department, as well as with a search bar for browsing keywords, and, with a filter, selecting a year or a type of project.

2. **Project List Page**

This page contains a list of all the projects realized in a particular department, and where the employee can still filter the search by writing a keyword in the search bar or select the year or type of project. The projects are listed by title, where it is possible to preview the project's description right below and, at the right, the person responsible for it (project manager).

3. **Project Page**

This page presents a specific project with its descriptive content. It encompasses the project title, the project context and description, the start and finish date, the impacts and goals, and the designated team (by showing an image, their name and respective role). In this page it is also possible to find an icon linking the project's page to its respective document in Google Drive. This hyperlink is only available to employees involved in the process, and the CEO.

In the Main Page, the user can choose the department in which the project being searched for was realized, or browse by name, project type and/ or year. Next, the employee is sent to the project list page; the filters may still be used, and a project can be selected. The department name appears on top if a department has been chosen, and no name appears if the project has been searched by keyword or filters. From there, the Project Page is shown, allowing for the employee to visualize its content in a simple and succinct manner. The search flow is represented in Figure 9.

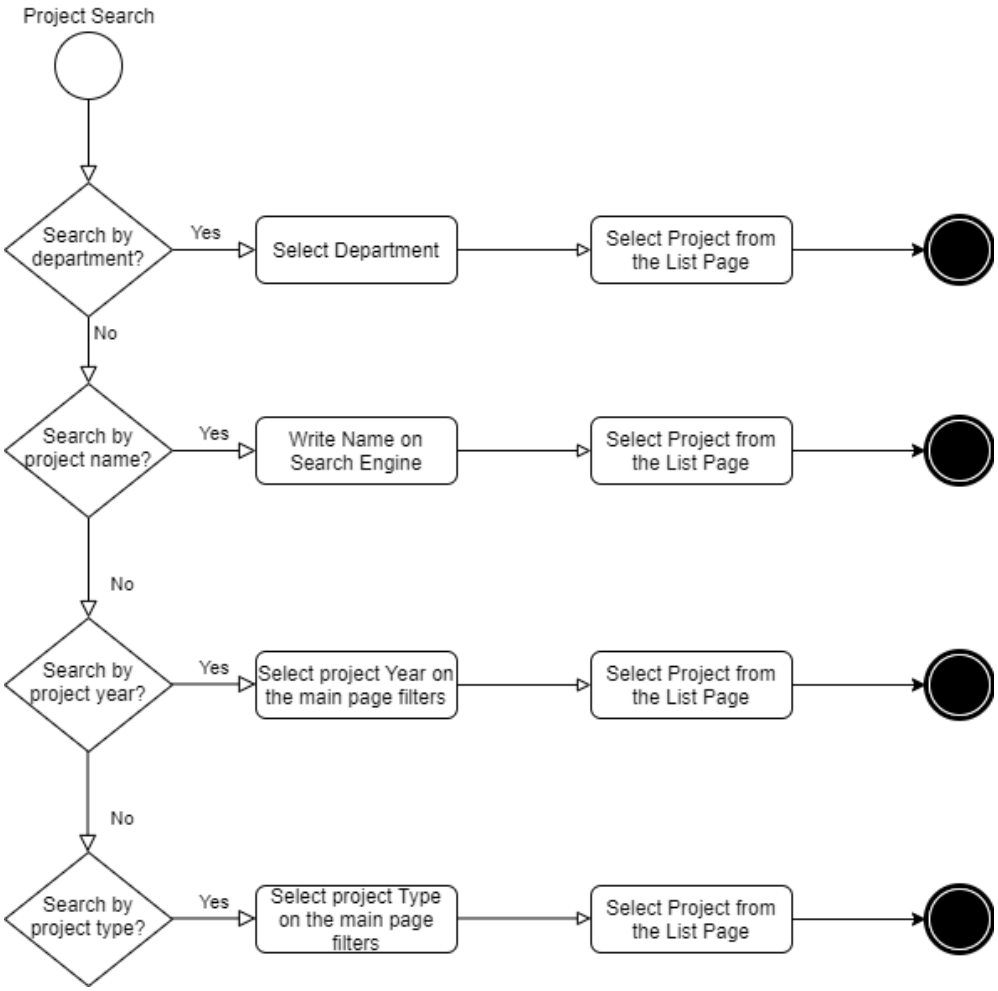


Figure 9 - Project Search Workflow

The summary of the actions performed is presented in Table 4.

Action ID	Action Description
A1	Creation of the RDI Project Form
A2	Creation of the RDI Project Follow-Up Form
A3	Creation of the Project Repository

Table 4 - Actions Developed for Project Portfolio Management

Therefore, in summary, for problems 1 and 2 developed for Project Portfolio Management, the actions studied and developed can be found in Table 5.

Problem ID	Problem	Cause	Action ID	Action Description

P1	Non-uniform documentation	C1.1	**A1**	Creation of the RDI Project Form
		C1.2	**A1**	Creation of the RDI Project Form
P2	Unorganized information	C2.1	**A2**	Creation of the RDI Project Follow-Up Form
		C2.2	**A3**	Creation of the Project Repository
		C2.3	**A3**	Creation of the Project Repository

Table 5 – Problems in Project Portfolio Management Activities with the Correspondent Actions

Finally, it is important to mention that Actions A1 and A2 are currently adopted at E-goi. As for Action A3, the proposal was presented, discussed and approved, with the intention of being implemented in the future.

5.2 Idea Portfolio Management

As previously mentioned, Idea management is a difficult process which E-goi is keen on improving. For this purpose, the current state of the idea management process was observed and analyzed. In order to obtain information regarding ideas and make sure all Department Heads and the CEO's perspectives were taken into consideration when developing solutions for the current issues, interviews were realized. The structure and content of the interview's questions was based on the framework presented by McGrath & MacMilan (2000) and by the observations taken from the company's activities and nature. The interview script and its descriptive results to all 10 interviewed can be found in Appendixes F and G, respectively.

Based on the NP4457:2007, the RDI idea management system should guarantee the creation, description, submission, evaluation or classification and registration of ideas in order to support their evaluation as product, process, organizational or marketing innovations. Additionally, the norm states that the RDI idea management system should ensure the communication of the overall performance of the idea management process, as well as give recognition to employees who participate in it. In order to fulfill the norm's requirements, several different activities were worked on and developed:

1. Creation of an idea Repository;
2. Definition of a workflow of the idea management process;
3. Development of specific templates for registering and submitting ideas;
4. Construction of a screening system for submitted ideas;
5. Definition of criteria for evaluating ideas.

The need for an Idea Repository is already fulfilled. E-goi registers and stores all idea submissions in the Idea page, at the Services function.

As previously stated, there are two different locations in Bitrix where ideas can be submitted by employees: in the Services Menu (in the "services" left menu option), and the suggestion workflow (through HR). This means that E-goi is already in accordance with the norm's requirements by having a designated space for idea submission. However, the fact that there

are two spaces for idea submission creates redundancy and ambiguity among employees, because they are unsure of what place is most appropriate for their particular suggestion. Therefore, there was a need to establish a cohesive RDI idea flow for the company. The steps that should be followed were based on the NP4457:2007 norm, and the flow developed is represented in Figure 19 (Appendix H).

The presented workflow already encompasses some of the solutions for the other listed activities: ideas are stored in the company's idea page in Bitrix, and that same page provides the single space defined for idea submission. The idea submission is uniform due to the development of a submission form, and the screening/ triage of ideas is made evident in the steps of the workflow. The definition of the evaluating criteria was also developed, and the evaluation moment is present in the workflow as well.

From the moment an idea emerges from its creator, it should be registered and submitted in an idea submission form, located in the Bitrix Idea page. The current form is not structured, which constitutes a problem for the company; therefore, based on the interview answers for questions number 1 and 7, and consequent analysis of the open ended questions (Appendix G), as well as a review of literature examples such as Gerlach and Brem's (2017) submission form, it was possible to understand what aspects to be filled when registering and describing an idea best suited E-goi:

- **Problem to be Solved and Objectives**

This first field was unanimously mentioned during the interviews. E-goi used to evaluate and select ideas that did not always pertain to business strategy or the strategic goals. The intention in this field is to automatically state what the current problem is and what the idea may come to solve or improve. Therefore, this first instance will contextualize the area in which the idea is inserted. Alongside this context, the idea should also be submitted with a clear value proposition. This means that the idea should be valuable, and the author of the idea should be able to make evident what value it brings, or the added value compared to the current solution.

- **Contextualization and Description**

Complementing the first field of the form is the contextualization of the solution and the description of how to proceed in order to develop it. The idea should be described in medium detail, allowing for new inputs to be inserted and for peers to complement and envision it in their own perspective. This gives the chance to expand an idea or make it more specific at any point. The description must include an overview of how the idea development and of how the implementation process should occur, even if it is a rough estimate. The goal is to give some shape to the idea in order for others to see it more clearly. This field may have information regarding the team, the development duration, the resources needed, the steps for implementation, and others.

- **Business Analysis**

The business analysis field allows for the employee to expand on the positive and negative aspects of the idea, perform a SWOT analysis regarding the potential strengths, weaknesses, opportunities and threats of the idea, synthesizing the pros and cons of the idea, evidencing the potential risks and others. This field was created based on close ended question number 7 from the Analysis category, where all interviewed unanimously agreed that the risks should be included in the idea characterization. Also mentioned by the CEO was the potential

inclusion of the SWOT analysis and the considerations for pros and cons as well as the positive and negative characteristics that were mentioned by other interviewed.

- **Financial Aspects**

Even though it can be difficult to ascertain expenses or profit values at the embryonic stage of an idea, the author should try to ballpark, as best to their ability, an estimate for initial costs, development costs, cost of resources, commercialization costs, return on investment (ROI), profits and other values considered relevant. As mentioned, these values may be difficult to establish, but the goal is to be able to give a general notion of the dimension and the impact that the development of the idea may have. Even though two more fields were identified (Market Impact and Innovation or Improvement Degree), the goal is to have a short form where ideas can have shape, but still be easily altered and molded. Both of these aspects can be mentioned in a field named “Additional Observations”, at the bottom of the form.

Based on the literature review and the interviews’ answers, the submission form was designed, and the result culminated in the form presented in Figure 10.

After an employee submits the idea in Bitrix’s page, the platform sends a notification to the RDI department in regard to the reception of a new idea submission. Subsequently, the form is received, the idea passes through a triage process where there is a brief evaluation in the RDI department. This step in the idea management process constitutes a first screening system for the submitted ideas. In this first stop, the idea is not evaluated in terms of technical execution, but on whether or not it is: complete; feasible; has a degree of innovation; and what personnel are best suited to deal with its development and execution if it is decided that it should move on to being evaluated by the most competent people to do so.

Therefore, here the idea is analyzed in terms of completion (if the idea is not complete the author is notified that the idea suggestion form should be further detailed and submitted once more) and defined as an RDI project or not. If the idea does not concern research, development or innovation, the submission is sent back to the idea author with the note that it should be submitted at “E-Balcão”, so HR can further analyze it. Additionally, the author will be involved in the idea process and development (if approved). This is an important remark considering that the author’s involvement will allow for detailed clarification on any doubts that may emerge; also, by keeping the author in the process, employees feel their ideas will be taken seriously and will be motivated to partake in sharing their ideas.

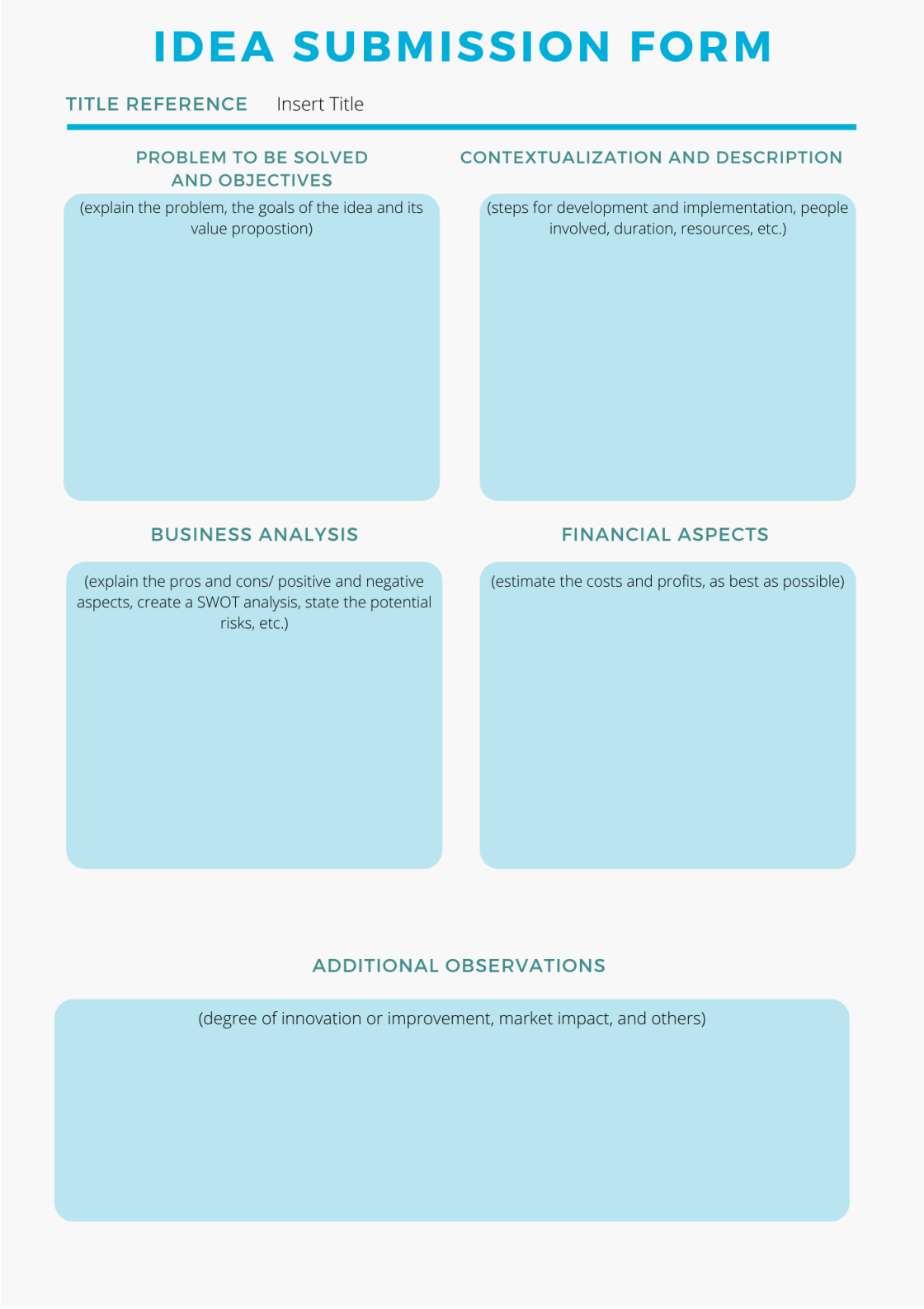


Figure 10 - Idea Submission Form Template

If the project is related to RDI, the idea will be published in the Bitrix Idea page for all employees to read. Simultaneously, the idea author will receive feedback of approval as the idea is published on the platform's page. After this stage, the submission is sent by the RDI department to the employee or group of employees they considered best suited to further investigate and analyze the idea in terms of technical development/ implementation. Notice how the swim lane of the evaluator(s) has an asterisk. This is due to the fact that the evaluator

or group of evaluators may differ depending on the dimension and impact of the idea. When this issue was raised to the Innovation Manager and the Department Head, the goal was to decide the best solution for the evaluation moment.

By analyzing the company's usual decision-making process regarding different types of decisions, it was possible to note three different circumstances, which led to the development of a solution (showcased and discussed with the Innovation Manager and the Department Head), allowing to settle on three types of evaluator groups:

1. **Department-head individually**

In this case, when the idea concerns only one department and the dimension and impact of it are slightly lower, a single Department Head will be in charge of evaluating the idea according to a specific set of criteria.

2. **Department-head committee**

When the idea is transversal to two or more departments, the evaluator group should consist of all of the Department's Heads involved in the development and implementation of the idea. Again, the idea should be discussed and evaluated according to a specific set of criteria.

3. **Department heads and CEO Committee**

Finally, and similarly to the previous type, when the idea involves two or more departments and its dimension and impact on the ecosystem of the company is high, all Department Heads should be involved (from the departments included in the development and implementation of the idea), alongside the CEO. This is due to the fact that an impactful idea should be evaluated by a group of people that can look at it holistically (both in technical terms and at the business level) and make the best choice concerning the company as a whole.

After this group is set, the idea is discussed and evaluated. As it is possible to notice in the workflow, the idea evaluation stage has two asterisks. This remark is crucial because, in this step, in order to decide a set of criteria for evaluating ideas, a tool was created for the evaluation moment. This tool was developed through the analysis of all of the answers to the interviews that were realized and through the literature review performed (Sukhov, Sihvonen, Netz, Magnusson & Olsson, 2020) (Dean, Hender, Rogers & Santanen, 2006), and it was created based on the need for a specific, tailored framework.

The model created consists of seven sections:

1. Mandatory
2. Feasibility
3. Valuable Criteria
4. Complexity
5. Risks
6. Return on Investment
7. Cost-Benefit

The section of "mandatory" is set to define whether or not an idea is obligatory and, if it is, how urgently it must be treated as. The four options are: "yes, in the next 6 months"; "yes, in the next 6 months to a year"; "yes, in over a year"; and "no". The more urgent the idea's execution, the higher the result. However, the resulting value is not included in the total of

100 %. This is due to the fact that, an idea can some up to 100 % in value; if, in addition, it is also urgent, then the value will surpass 100 % and be treated as urgent. This also sustains the notion that, if an idea is more valuable in criteria but less urgent, the field regarding mandatory ideas will allow for it to surpass the idea that is not urgent. This field is answered by marking one option only.

Afterwards, there is the field of feasibility. Whether or not the idea is visible, the evaluation will occur; however, if the answer is "no" in this particular field, there will be an inclusion as to why it is not feasible. After the evaluation is completed, the idea will be store in the Idea Repository in order to, in the future, be picked up again if the reason why it was not feasible ceases to exist. This field is answered by marking one option only.

In the valuable criteria section, the statements are made for a rating from 1 to 7. There are 21 questions in which the first seven questions are valued at 30 %, the following seven questions are valued at 20 %, and the last seven questions are valued at 10 %. These percentages were created based on the interview results, as well as the criteria used to create each question. Based on the reviewed literature, the question frame was defined so all could benefit from a neutral stance ("the idea (…)"). The questions were developed based on the literature review of criteria and the analysis of the interviews' answers. The topics mentioned are pertinence, market impact, feasibility, financial aspects, benefit and innovation or improvement degree (see Figure 17 in Appendix G). Additionally, the uncertainty regarding ideas was also mentioned. This field is answered by rating each statement with one option only, from 1 to 7.

Next, in the complexity field, the idea is divided into being "too complex to be developed", "complex, but possible" and "not complex". the idea will be more valuable the less complexity it holds. This field is answered by marking one option only.

Afterwards, in the risk section, the goal is to ascertain whether the risk degree is "high", "neutral/ manageable" or "low". The idea will be more valuable the lower risk degree it holds. This field is answered by marking one option only.

Regarding the return on investment, there are three possible choices as answer: "the return is lower than the investment", "the return is equal to the investment" and "the return is higher than the investment". The idea will be more valuable the higher the return on investment. This field is answered by marking one option only.

Lastly, in the cost benefit section, there are four possible choices based on the interview results: "high cost, low benefit", "low cost, little benefit", "high cost, high benefit" and "low cost, high benefit". In this respective order, the lesser value is an expensive idea with low benefit and, on the opposite end, the most valuable is a low cost idea that brings high benefits. This field is answered by marking one option only.

These sections have different weights considering how valuable they were perceived during the interviews. In that sense, mandatory, feasibility, complexity, risks, return on investment and cost benefit are all valued at a relative importance of 40 %. In the valuable criteria section, the relative importance is divided in 30 %, 20 % and 10 % (each seven questions).

The evaluation tool is represented in Figure 11 with an example of an optimal value idea that is not mandatory.

Therefore, after the evaluation moment, the evaluators decide on whether or not there is the ability to pursue this idea at the current moment with the feasibility field answered. If the answer is no, the submission will be "frozen" in the Idea Repository and saved until a better

time comes for its development. In the opposite scenario, if the time is right and the idea is viable, steps are taken in order to formalize the operational strategy concerning the idea and, in parallel, the creation of an RDI project form is set in place. Here is where the mapping and documenting of the RDI projects is inserted.

After formalizing the operational strategy, the idea will move on to being developed and implemented, thus finalizing the idea management process. It is also important to note that the project will have routine follow-up throughout its development and the commercialization process as well (if applied).

Although this step is not inserted in the idea management process, it is a concern in project management - therefore, the idea is followed and evaluated accordingly, as well as appropriately documented throughout (with the RDI Project Form and the RDI Project Follow-Up Form).

The summary of the actions performed is as follows:

Action ID	Action Description
A4	Creation of the Idea Process Workflow
A5	Creation of the Idea Submission Form
A6	Creation of the Idea Evaluation Tool

Table 6 - Actions Developed for Idea Portfolio Management

Therefore, in summary, for problems 1, 2 and 3 developed for Idea Portfolio Management, the actions studied and developed can be found in Table 7.

Finally, it is important to mention that Actions A4 and A5, the proposals were presented, discussed and approved, with the intention of being implemented in the future. As for Action A6, the proposal for the idea evaluation tool was well received and will be further analyzed.

From the interview results (presented in Appendix G), it is important to mention some conclusions taken:

1. Idea Submission Stage

The main conclusions taken from the analysis of the answer set obtained from the interviews for the creation and development of the Idea Submission Form are the inherent need for the idea to be pertinent, concerning the company's activities, goals and business strategy; the need for a complete description of the idea's context, including a business analysis and a description of the financial aspects involved; the need for the idea to be presented in medium detail, in order to provide some space for debate, changes and different perspectives.

2. Idea Evaluation Stage

The main conclusions taken from the analysis of the answer set obtained from the interviews for the creation and development of the Idea Evaluation Tool are: the pertinence of the idea and whether or not it is fulfilling a need; the level of clearness and completeness it is in terms of development steps and required resources (tangible, intangible and human); the presence or absence of a positive social perception; the ability to use the idea in different ways; the business strategy alignment; the anticipated competitive response degree; the timings involved (development, prototyping, testing, etc.); the uncertainties present; the market's

reaction; the commercialization potential; the degree of novelty or improvement and differentiation; the decision of whether or not it is mandatory to develop it, intimately related to the sense of urgency; the feasibility of the idea; the level of complexity involved; the risk degree present; the return on investment; and, finally, the relation between the cost and the benefit of the idea.

Problem ID	Problem	Cause	Action ID	Action Description
P3	Unclear RDI Idea Process	C3.1	**A4**	Creation of the Idea Process Workflow
		C3.2	**A4**	Creation of the Idea Process Workflow
P4	Confusing Idea Submission Process	C4.1	**A4**	Creation of the Idea Process Workflow
		C4.2	**A5**	Creation of the Idea Submission Form
P5	Undefined, Inconsistent Idea Evaluation Method	C5.1	**A6**	Creation of the Idea Evaluation Tool
		C5.2	**A6**	Creation of the Idea Evaluation Tool

Table 7 - Problems in Idea Portfolio Management Activities with the Correspondent Actions

Obligatoriness		
Yes, in the next 6 months		0
Yes, in the next 6 months to a year		0
Yes, in over a year		0
No	x	0
Feasibility		
Yes	x	20
No		0
If the answer was no, why is it not feasible?		
_____		
_____		
Rate statements from 1 to 7, where: 1 is "strongly disagree", 2 is "moderately disagree", 3 is "slightly disagree", 4 is "neutral", 5 is "slightly agree", 6 is "moderately agree" and 7 is "strongly agree"		
Valuable Criteria		
The idea is pertinent	7	14,28
The idea is clear and complete	7	14,28
The idea is fulfilling a specific need	7	14,28
The idea is aligned with the business strategy	7	14,28
The idea has a positive social connotation	7	14,28
The idea can have different applications	7	14,28
The idea's needed resources are attainable/ available	7	14,28
The idea is expected to succeed	7	14,28
The idea won't face an intense competitive response	7	14,28
The idea's development time is short	7	14,28
The idea has no developmental uncertainties	7	14,28
The idea will be developed by the most adequate ppl	7	14,28
The idea will increase the company's performance/ customer satisfaction	7	14,28
The idea's success criteria are well defined	7	14,28
The idea has a positive impact in the market	7	14,28
The idea will have a high adoption rate by the market	7	14,28
The idea has no legal or regulatory impediments	7	14,28
The idea will increase knowledge in its area	7	14,28
The idea will be successfully commercialized	7	14,28
The idea is innovative/ an improvement	7	14,28
The idea is differentiated	7	14,28
Complexity		
Too complex to be developed		0
Complex, but possible		0
Not complex	x	20
Risks		
The risk degree is high		0
The risk degree is neutral/ manageable		0
The risk degree is low	x	20
Return on Investment		
The Return is lower than the Investment		0
The Return is equal to the Investment		0
The Return is Higher than the Investment	x	20
Cost-Benefit		
High Cost, Low Benefit		0
Low Cost, Low Benefit		0
High Cost, High Benefit		0
Low Cost, High Benefit	x	20
		40,000
		29,988
		19,992
		9,996
	FINAL SCORE:	99,98

Figure 11 – Spreadsheet Model for the Idea Evaluation Tool (example at optimal value, not mandatory)

6 Conclusions and Future Research Directions

This last chapter is dedicated to presenting the conclusions taken from the project's development and detailing the future improvements or considerations formed from the analysis done. The conclusions will summarize the results obtained, showcase how they answered the practical objectives and the research questions established at the beginning of the project and the contribution to the literature. The future directions will establish improvement developments that can drive new research processes in the field of innovation.

6.1 Conclusions

This work set out to understand how innovation works at a SaaS company and in what ways it was possible to improve the current work methods, techniques, processes and tools. The framing of the project in the Portuguese norm NP4457:2007 allowed for a broader understanding of how an innovation framework should operate.

First and foremost, establishing the foundation and motivation for the project at the beginning proved to be critical to align all aspects of the workplan. For this purpose, starting by understanding the company was of utmost importance. Afterwards, by deeply studying the literature and comprehending the concepts surrounding the project, the study developed resulted in a much more complete and accurate body of work. In the specification of the problem, these two first steps also allowed for a clear setting of the company's current issues and the improvement opportunities. Consequently, in the data collection stage, the information gathered (through observation, literature review, root-cause analysis and interviews) was fruitful and proved itself pivotal for the next steps. From then on, the problem resolution and improvement proposals became clear and were produced founded by critical information obtained throughout the other stages.

Therefore, concerning RDI project portfolio management, the goal of understanding internal organization in terms of documentation and storage was fully attained. For this part of the project, templates were created in order to sustain the documentational needs of the company; also, the project repository was created to fulfill documentation and storage needs surrounding RDI projects. Both the documentation solution and the repository proposal were discussed and approved, currently being adopted in the company.

Concerning RDI idea portfolio management, the goal of establishing an idea evaluation method was fully attained. Additionally, several actions were developed in order to compliment the objectives set at the beginning of the project. Even though they were not specifically set, some of the actions performed were done in order to expand, compliment and offer value to the company so the project could be more complete and in full accordance with the innovation framework of the NP4457:2007. In that sense, the workflow for the idea process was created, which involved the establishment of where the ideas should be submitted (at the "Services" function, exclusively), how they should be submitted (through the submission form developed), where and how the idea screening ("triage") should be performed (by the RDI department, after the idea is submitted), and when and with what method the idea should be evaluated (with the idea evaluation tool designed). The workflow was presented, discussed and approved by the company, which intends on implementing at the company. Additionally, the template created was also approved and will be adopted by E-goi for idea submission. Lastly, for the Idea Evaluation Tool, the proposal was well received, and it will be further analyzed by the company.

Therefore, by establishing the completion of the project's objectives, it is also possible to confirm that the research questions set out at the beginning of the project were also fulfilled. The RQ1 was "How to redesign the management of RDI project's documentation when implementing an innovation management framework in a SaaS company?". This first research question was answered through the work developed for the Project Portfolio Management. The framing of the project in the Portuguese norm NP4457:2007 established the notions of what actions should be taken in order to successfully manage RDI projects. By having a Project Repository and a uniformized method for storing project information, the management of the RDI projects is fully attained.

As for RQ2, it was "Which criteria and priorities are emphasized, and how can they be incorporated, in an idea evaluation tool for an innovative SaaS company?". This RQ was also answered through the work developed for the Idea Portfolio Management. In this particular case, for the RDI idea evaluation moment, a tool was developed based on a set of criteria and a correspondent relative importance between them. Additionally, further fulfilling the need for the NP4457:2007 certification, an RDI idea process was also developed entailing different stages regarding different requirements. Therefore, not only was the research question answered, but it was also added and improved on (following the norm's standards).

It is also relevant to summarize the main conclusions taken from the analysis of the answer set obtained from the interviews. Regarding the Idea Submission stage, when developing the Idea Submission Form, the main conclusions taken were the need for the idea to be pertinent to the company's activities, the need for the idea to be well described and explained in medium detail, and the need for the idea to be contextualized from a business standpoint. Regarding the value of ideas, specifically for the development of the Idea Evaluation Tool, the main conclusions taken were the importance of its pertinence, its business strategy alignment, its range of action, the resources needed, its degree of competitive response, the timing, the uncertainties involved, the market's reaction and the commercialization potential. Additionally, in terms of action criteria, the main topics of relevance when evaluating an idea were: the specificity of its sense of urgency, alongside the need to establish whether or not it was mandatory to develop it; the feasibility of the idea; its level of complexity; the risk degree present; the return on investment; and, lastly, the relation between the cost and the benefit of the idea.

As for the theoretical contribution to the literature, the suggestion of a Project Repository for the documentation and storage of projects with all its particular characteristics allows for a centralized, uniform, accessible and updated solution for documenting and storing these types of projects. Concerning Idea Portfolio Management, the definition of the RDI idea process is of relevance towards establishing a cohesive flow for ideas inside a Software-as-a-Service company. As previously mentioned, the Evaluation and Selection stage of the Idea Management Process is one of the most complex; although many authors have created frameworks for idea evaluation and selection, there is still a large gap in the literature since ideas have a very abstract, intangible and relative nature. Therefore, by creating a tool for idea evaluation, the contribution towards filling the literature gap regarding this subject was of relevance.

6.2 Future Research Directions

The directions for the future encompass different topics. First and foremost, in terms of limitations concerning the project, the undeniable time constraint resulted in the implementation and assessment stages to be outside of the scope of this dissertation.

Regardless, the study conducted provided great input for future optimization of some elements at different stages in the innovation process.

Out of all the proposed solutions, the forms created for project portfolio management were effectively adopted in the company, and the repository will be implemented in the future. As for idea portfolio management, some of the solutions could not be tested in time in order to assess results. All in all, the fact that the NP4457:2007 certification was being pursued resulted in a general delay for implementation; this is because, in order to obtain the certification, there were still other aspects that needed to be fulfilled (as the implementation stage is still slightly far from the stage E-goi is currently in).

For the future, especially regarding idea evaluation, it would be interesting to test the idea evaluation tool in order to adjust and improve if needed; for an initial assessment trial, doing a "reverse-engineering" of the process could be interesting – by taking implemented or approved ideas and making them pass through the evaluation tool's criteria. Additionally, since there are different types of ideas and innovations, it would also be of relevance to try and focus more on each type, either by creating more similar tools but specific for each, or by adding to the one developed in order to contain more specifications for each type of idea and innovation.

In the future E-goi will continue to work towards implementing all of the Portuguese norm's requirements for obtaining the correspondent certification. In order to do so, there are still three other facets that should be developed and worked on.

In regard to the literature there are some gaps, mainly concerning the idea process and, more specifically, the idea evaluation stage. This project allowed for a small contribution in terms of ascertaining criteria for a SaaS company. Even though the project was tailored to the company it was developed for, the tool still touches on relevant idea criteria for other companies working with a software as a service business model. One important notion to take is that the correlation between more than one criteria is very evident. In this particular study, the relation between cost benefit was studied and there was a need to separate urgent and non-urgent ideas, mainly because these criteria together assumed a different value then if they were evaluated separately. Therefore, in the future, one suggestion would be to further analyze the relationships different criteria establish between themselves in order to better provide a consistent and accurate evaluation process.

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APPENDIX A: Company structure

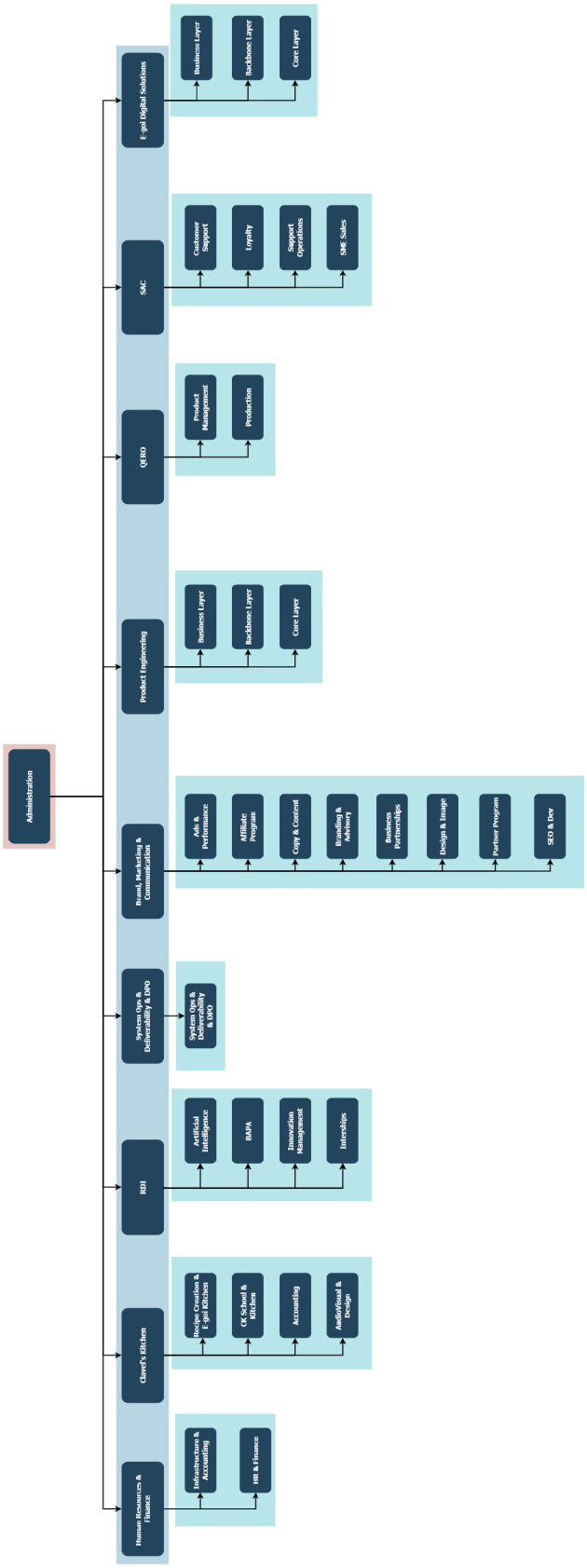


Figure 12 - E-goi's Organizational Structure

APPENDIX B: RDI Project Form

This document was created based on the NP4457:2007, with the goal to retrieve information regarding RDI projects. It is important to note that this document had a footer containing the project's name and the document version, alongside the number of the page. This document was kept in its original form (in Portuguese) since it was created specifically for E-goi's needs and capabilities, based on the norm's requirements.

Formulário "Ficha de Projeto I&D&I"

O objetivo do formulário "Ficha de Projeto de I&D&I" é recolher e documentar toda a informação relativa aos projetos de Investigação, Desenvolvimento e Inovação (I&D&I) da E-goi. Este registo tem como base a Norma Portuguesa NP4457, que se encontra, atualmente, a ser implementada ao nível global da empresa.

Reconhecendo que esta mudança processual possa gerar alguma confusão inicial, apresentamos uma pequena contextualização do documento e, de seguida, os conceitos de **I&D&I**, a dualidade entre **I&D** e **Desenvolvimento de Software (sw)**, os **Tipos de Inovação** existentes, de **Projeto de I&D&I** e, por fim, as **Fases/ Atividades típicas de um Projeto de I&D&I**.

Quanto ao preenchimento dos dados de cada projeto, este documento está dividido da seguinte forma:

1. **Dados do Projeto** - pretende-se dar uma introdução ao Projeto que vai ser descrito com a sua contextualização e respetivas descrição de objetivos, benefícios e resultados esperados, bem como listar as alterações que vão sendo efetuadas.
2. **Metodologia** - composta pela descrição das fases/atividades e tarefas a desempenhar pretende-se que esta parte seja minuciosa relativamente à forma como o trabalho é desenvolvido e validado.
3. **Recursos Alocados** - diz respeito ao planeamento da equipa alocada ao projeto e respetivas funções/responsabilidades. São identificados, também, os recursos necessários para o projeto.
4. **Observações Adicionais Pertinentes -** pretende-se que fiquem descritos os critérios de revisão, seleção e aprovação de resultados (quando apropriado), e que seja analisada a necessidade (ou o desejo) e a possibilidade de proteger a propriedade intelectual resultante ou derivada do projeto em questão. Qualquer informação relevante ou pertinente que se pretenda acrescentar, deve ser, também, inserida neste campo.

Conceito de I&D&I (de acordo com a NP 4456:2007)

Investigação - Indagação original e planificada que pretende descobrir novos conhecimentos e uma maior compreensão no âmbito científico e tecnológico.

Desenvolvimento - Trabalho sistemático desenvolvido com utilização do conhecimento gerado no trabalho de investigação e na experiência, com o propósito de criar novos ou significativamente melhorados materiais, produtos, processos ou serviços, inovações de marketing ou inovações organizacionais.

Inovação - Inovação corresponde à implementação de uma nova ou significativamente melhorada solução para a empresa, novo produto, processo, método organizacional ou de marketing, com o objectivo de reforçar a sua posição competitiva, aumentar o desempenho, ou o conhecimento.

I&D versus Desenvolvimento de SW (manual de Frascati)

O desenvolvimento de programas informáticos é uma parte integrante de numerosos projectos que, em si mesmos, não têm nenhuma componente de I&D.

Apesar disso, o desenvolvimento de software em tais projetos **pode-se classificar como I&D** sempre que produza um avanço no campo da informática, ou seja, **quando trazem progressos científicos e/ou tecnológicos que dão lugar a um maior conhecimento.**

Listam-se alguns exemplos que ilustram o conceito de I&D no SW:

- **Novos teoremas e algoritmos** na área da informática teórica.
- **Desenvolvimento de tecnologias** da informação no nível dos SO, linguagens de programação, gestão de dados, programas de comunicações e ferramentas para o desenvolvimento de software.
- **Investigação em métodos de desenho, desenvolvimento, adaptação e manutenção de software**.
- **Desenvolvimento de software que produza avanços** nas abordagens genéricas para a **recolha, transmissão, armazenamento, recuperação, tratamento ou apresentação de informação**.
- **Desenvolvimento experimental com fim de resolver lacunas de conhecimentos tecnológicos** necessários para desenvolver um sistema ou um programa informático.

Concluindo, consideram-se projetos de I&D quando se verifica a presença de um elemento apreciável de novidade e/ou na resolução de uma incerteza científica e/ou tecnológica.

Tipos de Inovação

Produto/Serviço - Introdução no mercado de novos ou significativamente melhorados produtos e serviços. Inclui alterações significativas nas suas especificações técnicas, componentes, materiais, software incorporado, interface com o utilizador ou outras características funcionais. A inovação do produto nos serviços, pode incluir: melhoramentos significativos na forma como é prestado (por exemplo: rapidez, eficiência), novas funcionalidades ao serviço e a introdução de novos serviços.

Processo Implementação de novos ou significativamente melhorados, processos de fabrico, logística e distribuição.

Organizacional Implementação no mercado de novos métodos organizacionais na prática do trabalho e/ou relações externas.

Marketing Implementação de novos ou significativamente melhorados métodos de marketing, envolvendo melhorias significativas no design do produto ou embalagem, preço, distribuição e promoção.

Projeto de I&D&I

Um projecto de I&D&I será considerado como tal se cumprir os seguintes requisitos:

Ter uma duração prevista não inferior a 3 meses;

Implicar um esforço de desenvolvimento não inferior a 1 homens-mês;

Ser um projecto que visa criar ou valorizar conhecimento com o objetivo de alcançar inovações de produto, de processo, de marketing ou organizacionais;

Ser um projeto que visa resolver problemas ou implementar melhorias de processos, de produtos, de marketing ou organizacionais.

Fases/Atividades de um projeto de I&D&I

Tipicamente um projeto de I&D&I pode ser constituído pelas seguintes fases/atividades, não se limitando às mesmas:

- Estudos Preliminares
- Especificações Técnicas
- Aquisição e desenvolvimento de novos conhecimentos e capacidades para o desenvolvimento do projeto
- Desenvolvimento
- Construção de protótipos
- Testes e ensaios
- Promoção e Divulgação de resultados

Dados do Projeto

Acrónimo e Nome do Projeto	
Versão (#)	

Lista de Alterações Efetuadas (nota: não esquecer de criar nova versão do documento)

#	Data	Descrição da Revisão

Contextualização

Tipo de Projeto (assinalar com "X")	Investigação		Tipo de Inovação (assinalar com "X")	Produto/Serviço	
	Desenvolvimento			Processo	

	Inovação			Organizacional	
				Marketing	
Responsável					
Data de Início		Duração Prevista			
Competências Necessárias					
Entidades Envolvidas (colaboração)					

Descrição

Descrição do problema a resolver / necessidade que lhe deu origem

Objetivos gerais e específicos do projeto

Resultados esperados para o projeto, incluindo, se aplicável, conceito e solução proposta

Aspetos Inovadores e, se aplicável, avanços técnico-científicos do projeto referindo incerteza(s) científica(s)/tecnológica(s) que o projeto procura resolver (Descrição do estado da arte do produto/processo/tecnologia em estudo, relacionando-o com soluções existentes na concorrência. Identificar, assim, de forma clara as lacunas existentes no mercado, pontos a melhorar e novidades que serão introduzidas através do projeto - se possível sustentar com referências bibliográficas)

Benefícios / Mais valias expectáveis (para a E-goi e/ou clientes e/ou sociedade)

Metodologia

Descrição do Trabalho (incluir atividades de verificação e validação - e.g. teste de protótipos)

Fase / Atividade do Projeto	Tarefas	Data de Início	Data de Fim	Milestones Previstas

Recursos Alocados

Definição da Equipa do Projeto

Nome (Colaborador)	Tempo Alocado (%) Função/	Responsabilidade no projeto	Período/ Fase do Projeto

Outros Recursos Necessários

Designação	Função	Período/ Fase do Projeto	Custo (€)

Observações adicionais pertinentes

Critérios de revisão,	

seleção e aprovação de resultados (quando apropriado)	
Disposições relativas à Proteção da Propriedade Intelectual	
Outras notas relevantes	

APPENDIX C: RDI Project Follow-Up Form

This document was created based on the need for maintaining up-to-date information concerning RDI projects. It is an added document to the previous shown, pertaining to the follow-up of the project's developments. It is important to note that this document had a footer containing the project's name and the document version, alongside the number of the page. Similarly to the first document, this one was also kept in its original form (in Portuguese) since it was created specifically for E-goi's needs and capabilities, based on the norm's requirements as well.

Formulário "Ficha de Acompanhamento de Projeto de I&D&I"

Dados do Projeto

Acrónimo e Nome do Projeto	
Número de relatório periódico	
Período de reporte	

Descrição

Trabalho desenvolvido no período de referência (Descrever as atividades de I&D&I levadas a cabo no período de referência, apresentando todas as dificuldades e problemas que foram ocorrendo no decurso dos trabalhos)

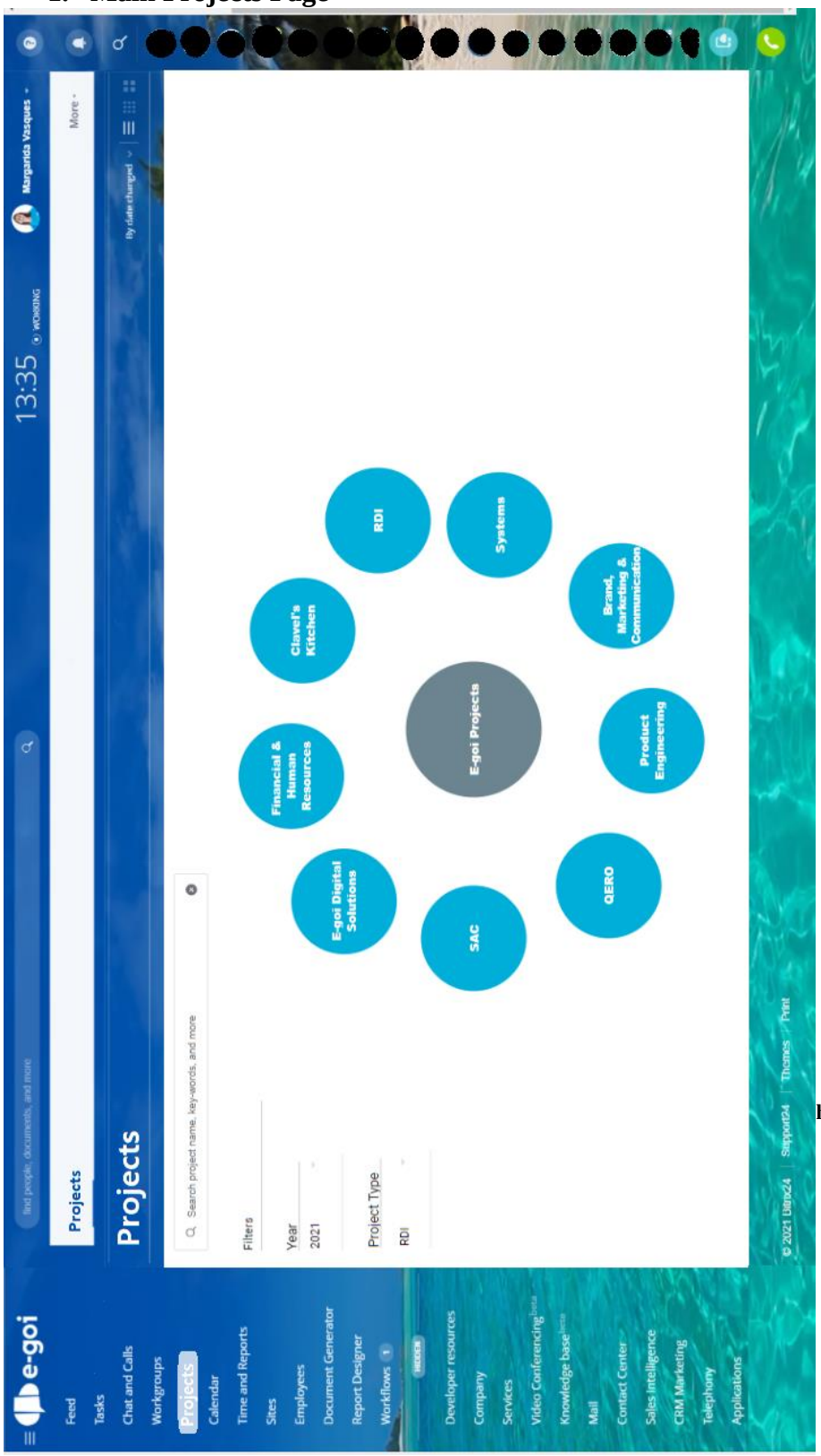
Resultados obtidos no período de referência (Indicar os resultados obtidos até ao final do período e eventuais necessidades futuras de desenvolvimento)

Se aplicável, análise crítica dos desvios, face aos objetivos e eventuais necessidades futuras

Anexar/Referir resultados/documentos produzidos no período de referência

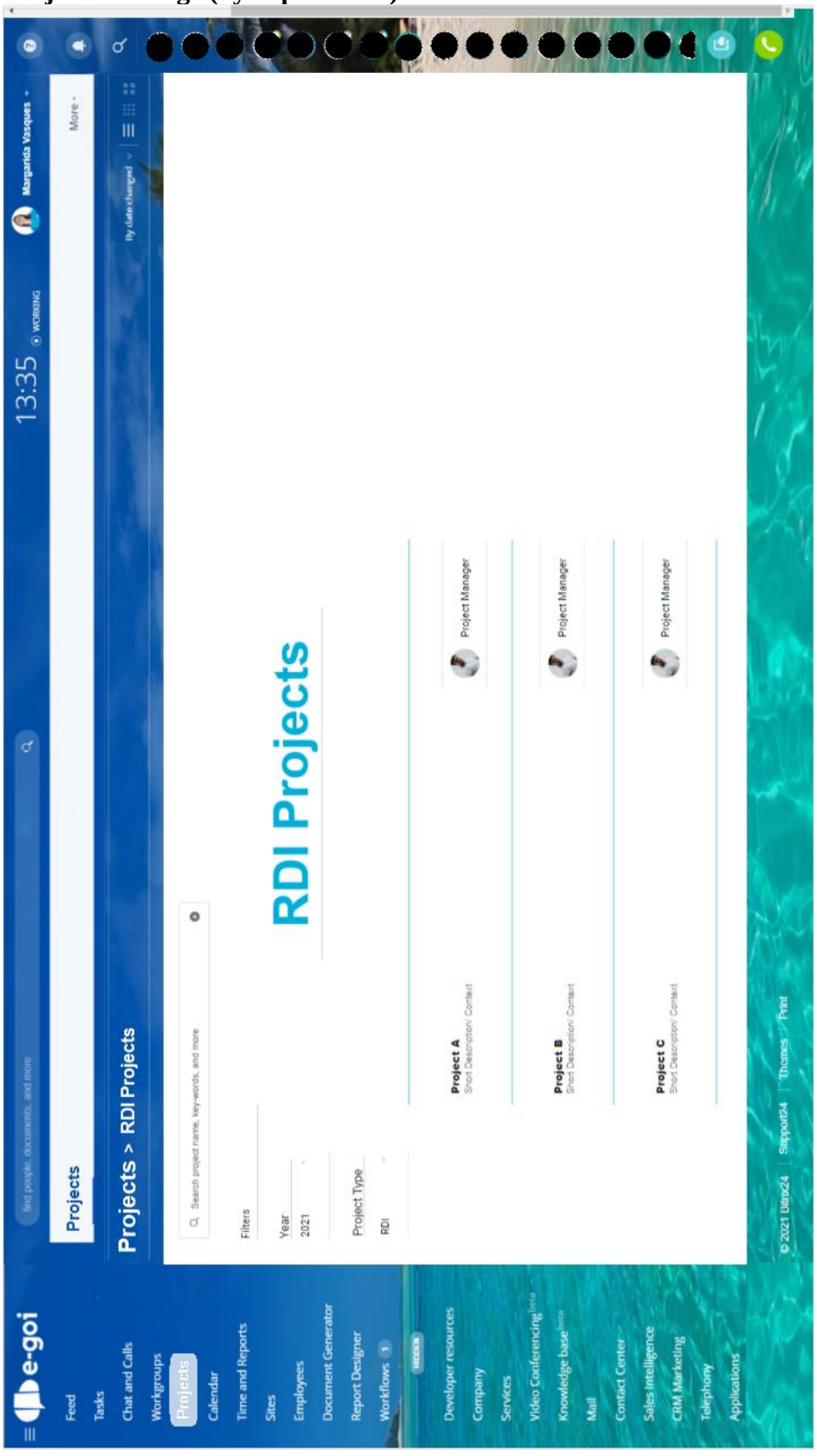
APPENDIX D: Project Repository Blueprints

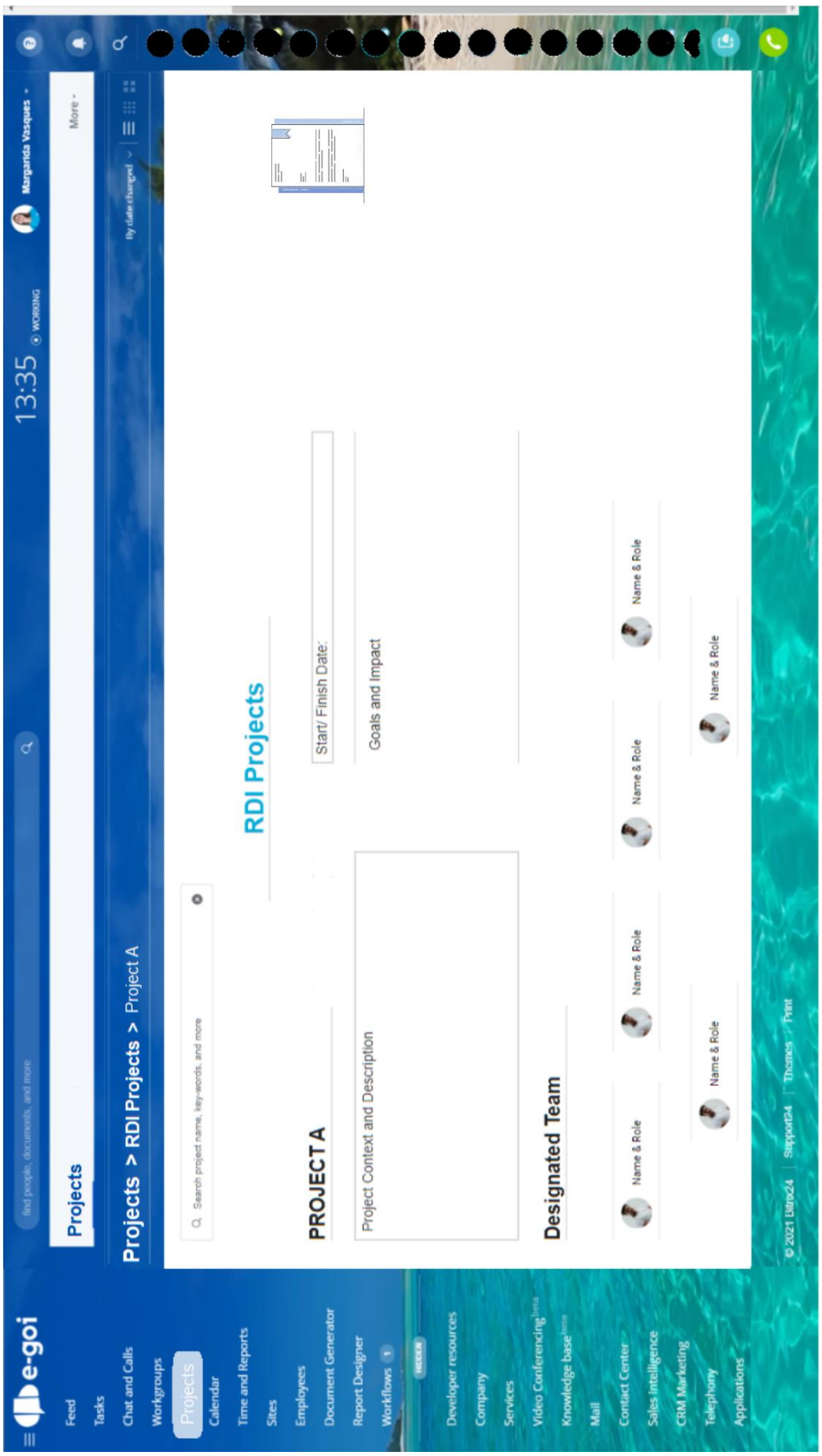
1. Main Projects Page



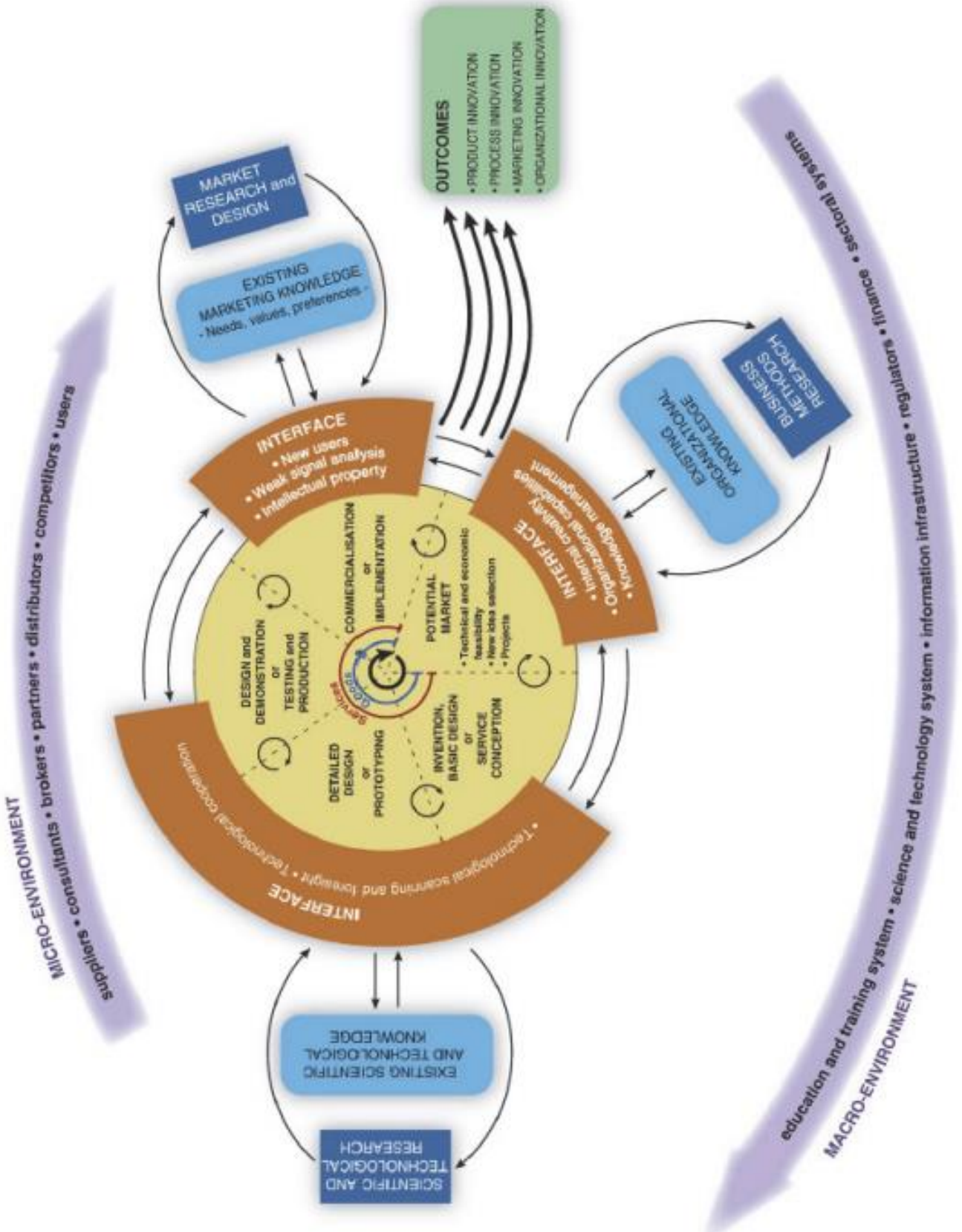
h)

2. **Project List Page (by department)**

3. 


e-goi
Feed
Tasks
Chat and Calls
Workgroups
Projects
Calendar
Time and Reports
Sites
Employees
Document Generator
Report Designer
Workflows
Developer resources
Company
Services
Video Conferencing
Knowledge base
Mail
Contact Center
Sales Intelligence
CRM Marketing
Telephony
Applications
13:35
Margarida Vasques
Projects
More
Projects > RDI Projects > Project A
Search project name, key-words, and more
RDI Projects
PROJECT A
Start/ Finish Date:
Goals and Impact
Project Context and Description
Designated Team
Name & Role
Name & Role
Name & Role
Name & Role
Name & Role
Name & Role
© 2021 Bitrix24
Support24
Themes
Print

APPENDIX E: Chain Interaction Model



APPENDIX F: Interview Script

Exploratory Interview for Idea Management and Evaluation

Contextualization

This interview aims to gather information about E-goi's ideas, from their genesis, to the path they follow (or should), and how they should be evaluated until their approval and consequent implementation or rejection.

This information will make it possible to carry out a study on the different processes linked to ideas within the company, in order to create a model for evaluating and prioritizing ideas.

This interview is divided into two parts, with open and closed questions. Closed-ended questions aim to value several statements from 1 to 7 (where 1 is “strongly disagree”, 2 is “moderately disagree”, 3 is “slightly disagree”, 4 is “neutral”, 5 is “slightly agree”, 6 is “moderately agree” and 7 is “strongly agree”). It is important to emphasize that extreme values should only be given when there is no alternative; that is, when the statement in question is totally incorrect and has no validity whatsoever (1), or when the statement is totally correct and there is no alternative that has more value (7). A score of 4 must be given to neutral statements and whenever there is uncertainty or inability to respond, it must be flagged “n.r.” – no response.

The factors concern:

1. Time
2. Regulation
3. Education
4. Blocking
5. Competitiveness
6. Exploration
7. Resources
8. Commercialization Costs
9. Development Costs
10. Spillover
11. External Uncertainty
12. Internal Uncertainty

Open-Ended Questions

1 What are the required information for an idea to be well described?

2 What are the main characteristics/ criteria an idea should have to be considered

valuable (so it is pursued)?

3 What are the main negative characteristics/ criteria that, when present in an idea, make it less valuable (so it is not pursued)?

4 When an idea emerges, what do you consider its natural course should be (regardless of their genesis)?

5 What criteria do you consider most relevant for prioritizing an idea A over an idea B, and what is the corresponding relative importance? Please distribute 100% for all the criteria.

Criteria	Relative Importance (0% - 100%)
	100%

Close-Ended Questions

This part contains statements regarding different factors. The statements are valued from 1 to 7 (where 1 corresponds to "strongly disagree" and 7 corresponds to "strongly agree"). A score of 4 must be given to neutral statements and whenever there is uncertainty or inability to respond, it must be flagged "n.r." – no response.

Analysis

	1 - 7
The idea must be evaluated among all Department Heads	
The idea must be discussed among all Department Heads	

The idea must be approved/rejected only by the CEO	
The idea must be approved/rejected only by the masters	
The idea must be in line with the business strategy	
The idea must be in accordance with the strategic objectives of the year in which it is placed	
The idea must be accompanied by an exposure of the associated risks/dangers	
The idea must ensure compliance with legal standards/requirements	
The idea must be developed/implemented according to the expected success	

Value

Time

	1-7
The idea has more value the greater the urgency	
The idea has more value the greater the need	
The idea loses value when it takes a long time to develop (development time exceeds desirable)	
The idea loses value when it takes a long time to complete (delays)	
The idea loses value when it takes a long time to be implemented (internal implementation process)	
The idea loses value when it takes too long to be tested	
The idea has value when it can meet the future needs of existing customers	

Regulation

	1-7
The idea loses value when there are too many regulatory barriers	
The idea has value when there are regulations favorable to its execution	

Education

	1-7
The idea loses value if it involves the education of the target market/customer	
The idea loses value if it involves the re-education of the target market/customer	
The idea loses value if it involves employee education	
The idea loses value if it involves the re-education of employees	
The idea loses value when the customer is involved in the development process	

The idea loses value the greater its development/implementation or execution complexity	

Blocking

	1-7
The idea loses value when entry barriers are high	
The idea loses value when there is early resistance to market entry	
The idea loses value when the competition has a pre-existing relationship with critical partners	
The idea loses value when it is socially or politically controversial	
The idea loses value when the competition is doing the same or similar	
The idea loses value when the competition is more influential in the area	
The idea loses value when the competition has the means to block its development	
The idea loses value when the competition has the means to block its implementation	
The idea loses value when there is a strong competitive response	
The idea has value when it is possible to anticipate a competitive response from companies with substantial resources	

Competitiveness

	1-7
The idea loses value when the competition has some of the best people in the field	
The idea loses value when other companies in other industries are developing similar solutions/technologies	
The idea loses value when it belongs to a very competitive area	
The idea has value if it allows an agreement between the strongest competitors for common interests	
The idea has value if the competition intends to use it instead of creating an alternative	

Exploration

	1-7
The idea has value when it is an extension of a business/service that is already offered	
The idea has value when formal mechanisms (patents, trademarks, etc.) are available to protect the business	

The idea has value when the company will have the opportunity to explore it in various ways	
The idea has value when it offers a specific solution/improvement for the company	
The idea has greater value the greater the exclusivity of the associated offer	
The idea has greater value the greater the exclusivity of an associated (or possible) partnership	
The idea has greater value the more standard/standard it becomes in the area	
The idea has value when it establishes a dominant position with critical customer groups in the area	
The idea loses value when there is a need to develop several actions in parallel for its realization	
The idea has value when there is a successful track record in marketing in the same area	
The idea loses value when, in the past, there was failure in the area	
The idea loses value when it brings insecurities related to development	
The idea loses value when it brings insecurities regarding integrity	
The idea loses value when it brings insecurities related to data protection	

Resources

	1-7
The idea has greater value the more it suits the company's resources	
The idea has value when there is no need to acquire resources	
The idea loses value when the resources needed are expensive	
The idea loses value when the necessary resources have to be developed in-house	
The idea has value when the development team fulfills all HR needs	
The idea has value when the assigned development team has superior skills to the competition	
The idea loses value when there are no resources needed to develop it	

Commercialization Costs

	1-7
The idea has greater value the greater the return on investment	
The idea has value when there is the necessary skill in the company for its commercialization	
The idea has value when it allows the gradual entry into the market (from a	

small to a larger one)	
The idea has value when it is possible to identify companies prepared to engage in joint marketing efforts	

Development Costs

	1-7
The idea has value when it is possible to distinguish successful paths from failure paths	
The idea has value when the criteria for the success of its development are clear	
The idea has value when it involves/develops efficient processes	
The idea has value when it is associated with external financial support	
The idea loses value when it requires overcoming many financial obstacles during its development	

Spillover

	1-7
The idea has value when it allows to reduce the cost of the current product(s)/service(s)	
The idea has value when it allows to increase the value of the existing offer(s)	
The idea has value when it allows to facilitate the development of other actions that are showing poor results	
The idea has value when its development allows to increase knowledge in a crucial new area	
The idea has value when it allows the creation of know-how and the development of advantageous skills, even after the end of the project	
The idea has value when it improves the company's overall reputation	
The idea has value when it increases the ability to react to abrupt or significant changes	
The idea loses value when it creates a danger of cannibalizing existing product(s)/service(s)	

External Uncertainty

	1-7
The idea loses value when the associated search is uncertain	
The idea loses value when the revenue stream generated is uncertain	
The idea loses value when the speed of approval by external regulatory bodies is uncertain	

The idea loses value when the speed with which the products will be accepted in the market is uncertain	
The idea loses value when the availability of necessary parallel technologies is uncertain	
The idea loses value when the profits generated can be controlled by third parties (governments, distribution channels, unions, etc.)	
The idea loses value when constant adjustments are needed (by external influence)	
The idea loses value when competition's developments are unknown	

Internal Uncertainty

	1-7
The idea loses value when the cost of development is uncertain	
The idea loses value when the return value is uncertain	
The idea loses value when resource costs are uncertain	
The idea loses value when the capabilities required for development are not found in the company	
The idea loses value when the availability of the necessary resources is uncertain	
The idea loses value when the ability to overcome obstacles is uncertain	
The idea loses value when the duration of development is uncertain	
The idea loses value when senior management commitment is uncertain	

Additional Observations

APPENDIX G: Interview Results

The analysis of the interview was conducted through a mix of quantitative and qualitative methods. In the Interview results it is possible to find the questions, a brief explanation as to why they were asked and what the intent was, and the results obtained, followed by a brief conclusion. This analysis and the results were made question by question and, at times, relating two or more topics from the same or from different categories.

Open-ended questions

1 What are the required information for an idea to be well described?

This question was intended to ascertain what topics should be present in the idea submission, so when it is read and analyzed, it can be complete and understandable, as well as uniform (making it easier for readers and evaluators). Making it less constricted by not referring the idea submission form, the goal was to separate from the way ideas are currently submitted, making it a "blank canvas". The results are summarized in Table 8.

Answer	Mentioned Percentage
Problem to be solved	100%
Contextualization and Description	90%
Value Proposition	50%
Financial Aspect	50%
Market Impact	20%
Innovation or Improvement Degree	20%

Table 8 - Answers by Topics and Respective Percentage for Open-Ended Question Number 1

Problem to be solved: the heads of the departments and the CEO stated that, first and foremost, an idea should entail the reasoning and foundation as to what problem it intends to solve and how, including an identification of a need (if applied).

Contextualization and Description: the idea should be described in medium detail (leaving space for discussion, easy modification and adaptability). When asked for main descriptive contents they would include in this topic, the interviewed replied:

- Development Overview (the team involved, estimate of duration, estimate of resources and steps for implementation)
- Strategic Overview (SWOT analysis or pros and cons description, a description of the benefits involved, and of the dimension/ impact of the idea)

Value Proposition: there should be a distinction between how the new idea will add (more) value than the current solution.

Financial Aspect: the interviewed expressed a need to understand the costs and profits surrounding the idea. This need involved initial costs, development costs, investment, return on investment and profit. This notion was also very related to "Cost-Benefit". Even though the interviewed mentioned a financial aspect as the main focus, all 5 ended up relating costs to the measurable benefit associated. In fact, they mentioned that, if there is no benefit from the

idea, even if the costs associated are low, there'll be a lack of interest to pursue it. On the contrary, if the benefits from the idea are extremely high and valuable, the idea is more likely to be followed, even if the costs are higher than desirable.

Market Impact: Market needs and the way an idea influences their activity should be noted.

Degree of Innovation: Lastly, two of the respondents mentioned that an idea should be described by the degree of novelty it brings.

2 What are the main characteristics/ criteria an idea should have to be considered valuable (so it is pursued)?

The goal of the second question was to separate the fact that an idea that is well described may not have value. For that reason, it was important to understand what are the main characteristics that make an idea valuable. The results are presented in Table 9.

Answer	Mentioned Percentage
Pertinence	80%
Profitability or Cost Reduction	60%
Innovation or Improvement Degree	50%
Market Impact	50%
Feasibility	40%
Others	20%

Table 9 - Answers by Topics and Respective Percentage for Open-Ended Question Number 12

Pertinence: in this topic, most interviewed answered that pertinence makes an idea valuable. This means that the idea should pertain to any of the company's activities or interests and complement them. Additionally, it was mentioned that ideas that have a sense of urgency or obligatoriness also weigh more in terms of value.

Profitability or Cost Reduction: 60% of the interviewed stated that an idea had more value when it was possible to profit from it or, at least, reduce current costs. Similarly to the first question, all interviewed that mentioned costs related the notion with benefit ("cost-benefit"), stating that an idea must balance the benefits that it brings with the costs it entails.

Innovation or Improvement: half of the interviewed stated that an idea is more valuable when it offers a degree of novelty or improvement to the current status of the company's activities.

Market impact: 50% stated that the positive impact an idea has in the market makes it more valuable.

Feasibility: an idea has value if, considering the company's current state, available resources and current and potential capabilities, it's possible to pursue.

Others: considering this question to be of high importance for idea evaluation, it was relevant to register every characteristic even if they were not mentioned by more than one person. Therefore, other characteristics and criteria mentioned were – degree of complexity and the ability to be a transversal solution for more than one problem/ opportunity ("spillover").

3 What are the main negative characteristics/ criteria that, when present in an idea, make it less valuable (so it is not pursued)?

Similarly to the second question, it was important to distinguish what characteristics or criteria would make an idea lose value. When absent, these characteristics may not make an idea more valuable; however, when present, they take all of the value out of the idea making unattractive. The results are presented in Table 10.

Answer	Mentioned Percentage
Lack of Purpose	70%
Low Benefit (Cost-Benefit)	70%
High Degree of Complexity	60%
Lack of Value for the Market	40%
Lack of Differentiation	30%
Others	30%

Table 10 - Answers by Topics and Respective Percentage for Open-Ended Question Number 13

Lack of Purpose: according to the interviewed, the company used to have the habit of pursuing ideas simply because they "sounded cool". Nowadays, this habit has been broken and now, for idea discussion and evaluation there must be an explanation as to why it is relevant and purposeful. Which means that, when an idea does not fulfill a need or solves an issue related to the company, it is considered of lesser value.

Low Benefit (Cost-Benefit): 70% of the interviewed made the connection between Cost and Benefit stating that, even if the costs are not elevated, if there's no tangible benefit, it will not be valuable to pursue.

High Degree of Complexity: having too big and complex of an idea can make it less valuable. When the company has difficulty in allocating resources (tangible, human and time), it becomes a challenge to manage its execution, decreasing its value.

Lack of Value for the Market: the interviewed stated that an idea that does not offer any value to the market, does not have much value on its own.

Lack of Differentiation: there should be a component of differentiation (innovation) or of significant improvement in order to accommodate value; otherwise, it becomes a replica.

Others: similarly to the previous question, this information is of high importance for idea evaluation as well, which means it was also relevant to register other characteristics (even if mention only by one person). Therefore, other characteristics and criteria mentioned were – the endangerment of paralyzing other activities/ services inside the company or the platform was mentioned by one interviewed and stated as a critical devaluing characteristic. Also, a high level of dependency of maintenance constituted one other criteria of lesser value. Finally, one interviewed mentioned that, the lack of availability of resources for idea development would generate a different level of quality and, consequently, of value. Additionally, they mentioned the timing of the idea may not be the best: individually, as a characteristic, this does not necessarily make the idea less valuable; however, when confronted with the lack of

resources for development or the urgent need for it, the idea decreases in terms of feasibility which, ultimately, makes it less valuable.

4 When an idea emerges, what do you consider its natural course should be (regardless of their genesis)?

In this question, more than half of the interviewed mentioned that it was important have a place for ideas suggestion that would catapult the idea flow inside the company. Due to the communicative and informal nature of E-goi, many ideas are generated at any point in the company and tend to be discussed between peers, "bouncing" ideas off each other. For that reason, some of the interviewed manifested a concern in regard to creating an over-bureaucratical process for this organic and dynamic habit. Taking this concern into consideration, the goal was to assess how each Department Head and the CEO would accommodate the idea management process. The steps most commonly mentioned were:

1. Idea description and characterization
2. Discussion
3. Evaluation
4. Implementation
5. Commercialization (if applied).

As studied throughout the literature, the idea management process entails all of these steps, which means the interviewed showcased a fair knowledge on how to proceed with idea management. For this particular question, the results from the interviewed were combined with the norm's requirements and discussed with the Department Head and the Innovation Manager to find a solution (presented in the section number 5.2 of the Results).

5 What criteria do you consider most relevant for prioritizing an idea A over an idea B, and what is the corresponding relative importance? Please distribute 100% for all the criteria.

This question was aimed at forcing the interviewed to, out of all of the mentioned valuable criteria, choose which criteria had more weight in the decision moment. The pool of criteria mentioned was constituted by (Figure 18):

1. Pertinence
2. Market Impact
3. Financial Aspects
4. Feasibility
5. Innovation or Improvement Degree
6. Benefit

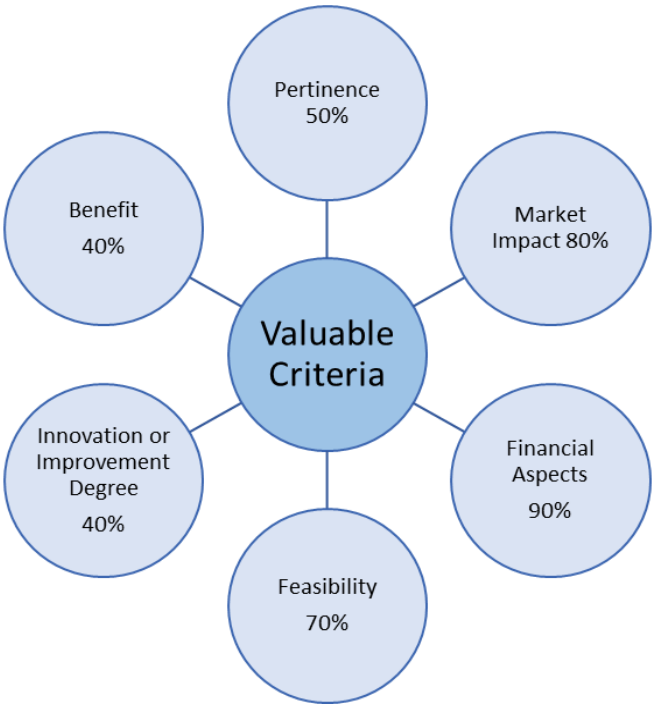


Figure 17 - Pool of Valuable Criteria Categories and Mentioned Percentage for Open-Ended Question Number 5

This means that, in terms of Pertinence, 5 out of the 10 interviewed stated it is a valuable criteria. The same goes to the 8 out of 10 people that mentioned Market Impact as a valuable criteria, as well as 9 out of 10 people mentioning Financial Aspects as criteria that entails value. For Feasibility, 7 out of the 10 interviewed mentioned it as having value, 4 out of the 10 highlighted Innovation or Improvement Degree and, lastly, Benefit was mentioned, as well, four out of 10 times. The relation between cost and benefit was mentioned by 3 of the interviewed, and 1 made a distinction between the two criteria (giving them separate scores).

By dividing valuable criteria into these categories, we are able to add all the percentages attributed to each category in the relative importance column and divide them by the number of people who mentioned the category. Also, by considering the median and the mode alongside the average, it is possible to take some more conclusions. These are the results for each category (Table 11).

Criteria Category	Average Relative Importance	Mode	Median

Pertinence	32%	ND[3]	30
Market Impact	20%	10, 30	20
Financial Aspects	31.6%	30	30
Feasibility	33.5%	ND	30
Innovation or Improvement Degree	21.3%	ND	15
Benefit	18.8%	10	15

Table 11 - Answers per Criteria Category in Relative Importance Average, Mode and Median for Open-Ended Question Number 5

From this set of results it is possible to conclude that Feasibility, Pertinence and Financial Aspects represent some of the biggest concerns regarding idea value. Also, by looking at the values of the mode and the median, it is possible to see that the average is not distant from the most answered number and of the middle value of the total scoring for each of these categories. These scorings are consistent with the results from question number 2, where we see that value is greater when the idea can, in fact, be realized, when it presents a solution for a problem and when the costs and profits associated are, respectively, lower and higher. Innovation or Improvement Degree and Market Impact resulted in averages on the realm of the 20%; the category for Innovation or Improvement Degree registered a slight deviation of 6.3% from the median to the average. This means that the middle value of the range of the total answers was 15, registering a higher value from that point up, which resulted in a higher average. Ultimately, one of the results was much higher than the rest, meaning one person considered this aspect of more importance than the others. Lastly, the Benefit registered the lowest average, in accordance with both its mode and median results. However, it is still important to mention that, even though benefit scored the lowest (18.8%), it was associated in most cases with the costs. The relation "Cost-Benefit" was, therefore, studied in greater detail, where it was possible to define the correlation through Figure 19.

[3] Not Determined

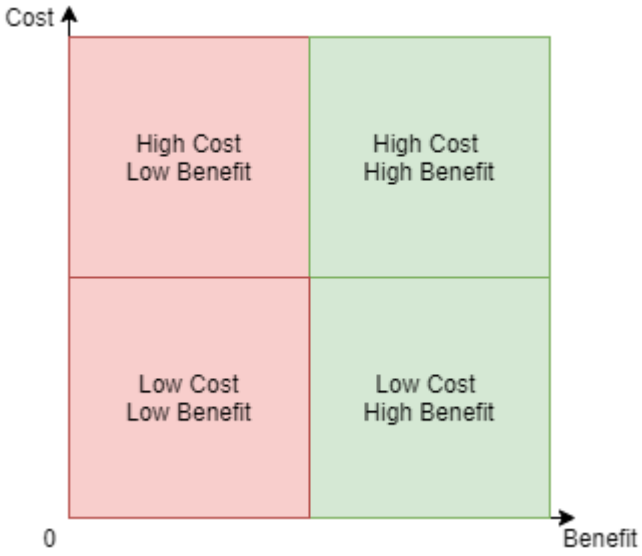


Figure 18 - Cost-Benefit Priority Analysis at E-goi

The red sections of the figure correspond to situations where the relation between cost and benefit are not of interest to E-goi. As previously mentioned, ideas tend to lose value for the interviewed the less benefit for the company they carry. As such, regardless of the costs being low or high, ideas don't have the same value as when the benefits are higher. In those cases, represented by the green sections, the investment is made in an easier manner if the costs are low; however, even if the costs are high, chances are that, if the benefits are equally high, the company will try to realize it.

Close-ended questions

The section of close-ended questions was created in order to understand the influence some factors have in the evaluation stage. The interviewed were asked to rate statements from 1 to 7, where 1 is "strongly disagree", 2 is "moderately disagree", 3 is "slightly disagree", 4 is "neutral", 5 is "slightly agree", 6 is "moderately agree" and 7 is "strongly agree". Additionally, they were asked to consider that extreme values should only be given when there is no alternative: when the statement in question is totally incorrect and has no validity whatsoever (1), or when the statement is totally correct and there is no alternative that has more value (7). If there was any uncertainty or inability to respond, the answer was flagged with "n.r." – no response. The general goal was to make the interviewed separate factors in terms of higher or lower value in an idea.

In order to do so, the questions were divided into categories concerning different factors analyzed from the literature as most relevant or most common. Primarily, there is a section of idea analysis related to a business and operation perspective of an idea inside the company. Afterwards, the sections concerned the following factors, regarding value: Time, Regulation, Education, Blocking, Competitiveness, Exploration, Resources, Commercialization Costs, Development Costs, Spillover, External Uncertainty and Internal Uncertainty. Here are the results.

- Analysis

The first two questions in this category pertained to the difference between evaluation and discussion amongst all Department Heads, asking the interviewed if they believed:

Question 1 - The idea must be evaluated among all Department Heads

Question 2 - The idea must be discussed among all Department Heads

	Average	Mode	Median	Standard Deviation
Question 1	3.4	5	4	1.62
Question 2	4.4	5	4.5	1.2

Table 12 – Statistical Results for Close-Ended Questions Number 1 and 2 of the Analysis Category

In these two questions it's possible to see that the averages ranged from negative to neutral (Table 12). In the first question, the Department Heads that gave a positive remark stated they "slightly agree" with the statement (5); however, the ones that valued the statement negatively did so by strongly and moderately disagreeing (1 and 2, respectively). The interviewed more drawn to negative and neutral responses were those who work in a more operational basis and on the administrative end. These revealed that they believed not all Department Heads should be evaluating all types of ideas (especially due to the dimension and the scope of the idea).

In the second question, the interviewed gave a more positive response towards the statement. Similarly to the first question, most of them stated that there was a dependence resulting from the dimension, scope and pertinence of the idea, yet ultimately considering that the exchange of knowledge could be beneficial, and even provide a broader scope of the idea.

The two questions that followed pertained to the difference between involving Department Heads and/ or CEO in the decision-making process, asking the interviewed if they believed:

Question 3 - The idea must be approved/rejected only by the CEO

Question 4 - The idea must be approved/rejected only by the masters

	Average	Mode	Median	Standard Deviation
Question 3	1.6	1	1	0.92
Question 4	2.2	1	1	1.72

Table 13 Statistical Results for Close-Ended Questions Number 3 and 4 of the Analysis Category

These questions were included in order to confirm an observation made throughout the understanding of the company's work (Table 13). Because of the horizontal nature of the company, the tendency was to disapprove of the notion that only the CEO are only the masters should evaluate an idea. Most of the answers leaned towards strongly disagreeing with the involvement of only the CEO and moderately disagreeing with the involvement of only the masters. In these statements, the dimension and impact of the idea also proved to be considering factors in the involvement for the evaluation stage.

The next two questions of this category pertained to the relevance of the idea being aligned with the company's goals, asking the interviewed if they believed:

Question 5 - The idea must be in line with the business strategy

Question 6 - The idea must be in accordance with the strategic objectives of the year in which it is placed

	Average	Mode	Median	Standard Deviation
Question 5	6	6	6	0.89
Question 6	4.8	6	5	1.54

Table 14 - Statistical Results for Close-Ended Questions Number 5 and 6 of the Analysis Category

These statements were asked in order to understand if the decision makers would exclude ideas in case they were disruptive or did not relate to the current work being done. In question number 5, the answers were all seamless, including only a neutral response (4) and having the rest ranging from slightly to strongly agreeing with the statement (Table 14).

In the case of question number 6, the tendency was to answer positively; in fact, 8 out of the 10 interviewed responded with slightly or moderately agreeing. However, the 2 interviewed that responded negatively did so by slightly and strongly disagreeing (3 and 1, respectively), which brought the average down and created a larger deviation. When asked why, the interviewed stated that a valuable idea could emerge during the year in question without being planned; in those cases, the company should try to "squeeze" it onto the work to be done in order to take advantage of it.

The seventh question of this category pertained to the inclusion of risks in the idea explanation, asking the interviewed:

Question 7 - The idea must be accompanied by an exposure of the associated risks/dangers

	Average	Mode	Median	Standard Deviation
Question 7	6.6	7	7	0.49

Table 15 - Statistical Results for Close-Ended Question Number 7 of the Analysis Category

Concerning question number 7, it is possible to understand that all employees positively respond to the notion that the risks of an idea should be detailed when an idea is described (Table 15). As we can see from the statistics, this statement was moderately and strongly agreed with.

The eighth question of this category pertained to the importance of following legal impositions, asking the interviewed:

Question 8 - The idea must ensure compliance with legal standards/requirements

	Average	Mode	Median	Standard Deviation
Question 8	6.1	6	6	0.7

Table 16 Statistical Results for Close-Ended Question Number 8 of the Analysis Category

In question number 8, as seen in Table 16, all interviewed responded positively and slightly to strongly agreed with the statement (5, 6 and 7). The answers were based on the notion that legal requirements should be followed, but they do not dictate whether or not an idea is pursued.

The last question of this category pertained to the relevance of expected success for development and implementation, asking the interviewed:

Question 9 - The idea must be developed/implemented according to the expected success

	Average	Mode	Median	Standard Deviation
Question 9	5.4	5	5	0.8

Table 17 - Statistical Results for Close-Ended Question Number 9 of the Analysis Category

Finally, in this last question, the interviewed responded positively to the notion that an idea should be pursued if the success rate justifies it (Table17). Therefore, an idea that may not be successful is not as easily pursued as one that may be expected to succeed.

- Value

Time

The first two questions of this category pertained to the difference of value between urgency and necessity, asking the interviewed if they believed:

Question 1 - The idea has more value the greater the urgency

Question 2 - The idea has more value the greater the need

	Average	Mode	Median	Standard Deviation
Question 1[4]	5	6	5	1.05
Question 2	5.5	5	5	0.92

Table 18 - Statistical Results for Close-Ended Questions Number 1 and 2 in the Time Category

These first two questions aimed at compelling the interviewed to state what would be more relevant: urgency or necessity (Table 18). These distinctions sparked a discussion since the terms can, at times, be related. Therefore, the answers for the first statement ranged from slightly disagree (3) to moderately agree (6). In that sense, it is possible to see that the answer set pertains to a generalized agreement that urgency brings value to the idea. However, when

[4] In question number 1 of the Time category, one of the interviewed flagged the No-Response (NR) answer. In this particular case, the interviewed stated that urgency was too difficult to relate to value, and therefore could not give a mindful and concise answer.

the two sets of answers are compared, it is possible to see that the interviewed associated a higher value to a necessity. The answers for this question ranged from a neutral response (4) to a strong agreement (7). Because the set of answers were more localized in range, the deviation obtained was lower than the one obtained in the first question.

Additionally, and although urgency was not considered more valuable, a time constriction was mentioned: because sometimes ideas may have an "expiration date", urgency will surpass necessity in terms of development, implementation and deployment. Sometimes ideas emerge and, although they are not more valuable, due to their urgency, they are labeled as top priority; if they were stacked according to their value, by the time the development started, the idea would no longer be viable, since the timing would have expired.

The next four questions of this category pertained to the value of an idea in relation to different timings, asking the interviewed if they believed:

Question 3 - The idea loses value when it takes a long time to develop (development time exceeds desirable)

Question 4 - The idea loses value when it takes a long time to complete (delays)

Question 5 - The idea loses value when it takes a long time to be implemented (internal implementation process)

Question 6 - The idea loses value when it takes too long to be tested

	Average	Mode	Median	Standard Deviation
Question 3	5.4	6	6	1.12
Question 4	5.2	6	5.5	1.25
Question 5	5.2	5	5	1.08
Question 6	4.7	6	5	1.62

Table 19 - Statistical Results for Close-Ended Questions Number 3, 4, 5 and 6 in the Time Category

These questions obtained similar results, considering they divide the timings through different stages (Table 19). In question number 3, the response range was wider, having when person slightly disagreeing with the statement (3), one being neutral (4), and the remaining answering between slightly agreeing to strongly agreeing (5, 6 and 7). In that sense, most interviewed agreed that an idea is not as valuable if the developments involved are not timely.

Questions number 4 and 5 scored positively, yet close to a neutral consensus. Both questions ranged from slight disagreement (3) to strong agreement (7), which resulted in a higher deviation. In that sense, most interviewed tended to agree that having known delays and long internal implementation processes would diminish an idea's value.

Lastly, in question number 6, the result was mainly neutral (tending to a positive response). This question registered answers ranging from moderate disagreement (2) to a strong agreement (7). The interviewed related to innovation strongly agreed with the statement, but people involved in operations tended to disagree or be neutral. When it comes to the administrative involvement, the tendency was to slightly agree. This may have to do with the fact that these different perspectives are at play: the interviewed connected to innovation believe the idea would lose value if the testing phase were long due to the need for concrete

results (related to innovative efforts); however, the interviewed connected to the operationalization of the ideas tend to believe that long testing phases don't devalue an idea, since they see it as an inevitable and needed stage; lastly, the administration seems to find a middle ground for believing that longer test periods bring concerns regarding time, resources and costs, but also acknowledge that it might be an unavoidable necessity.

Therefore, long testing periods can be seen as neutral or slightly devaluing, depending on the idea itself, the benefit it brings, the time that may be needed and the availability of the necessary resources.

The last question of this category pertained to the value of timing regarding a more complete solution, asking the interviewed:

Question 7 - The idea has value when it can meet the future needs of existing customers

	Average	Mode	Median	Standard Deviation
Question 7	5.9	6	6	0.83

Table 20 Statistical Results for Close-Ended Question Number 7 in the Time Category

For this question most interviewed responded from slight to strong agreement (5, 6 and 7), except for one neutral response (4), which means an idea has value when it can fulfill future needs (Table 20).

Regulation

The two questions of this category pertained to the relevance of regulation, asking the interviewed if they believed:

Question 1 - The idea loses value when there are too many regulatory barriers

Question 2 - The idea has value when there are regulations favorable to its execution

	Average	Mode	Median	Standard Deviation
Question 1	4.9	6	5.5	1.58
Question 2	5.4	6	6	1.56

Table 21 - Statistical Results for Close-Ended Questions Number 1 and 2 in the Regulation Category

In both of these questions, the answers ranged from 1 to 7 (Table 21). With that being said, the average result was positive for both, slightly agreeing that an idea loses value when there are too many regulatory barriers, and that an idea has value when regulations favor their execution. However, some of the interviewed clearly stated that, concerning the first question, the regulatory barriers don't pose an impediment to the pursuit of an idea if it is considered valuable; moreover, concerning the second question, an idea gains a point to their advantage if, beyond being valuable, is supported by favorable regulations.

Education

The first two questions of this category pertained to the distinction between educating and reeducating an audience, asking the interviewed if they believed:

Question 1 - The idea loses value if it involves the education of the target market/customer

Question 2 - The idea loses value if it involves the re-education of the target market/customer

	Average	Mode	Median	Standard Deviation
Question 1	4.7	5	5	0.9
Question 2	4.9	5	5	0.94

Table 22 - Statistical Results for Close-Ended Questions Number 1 and 2 in the Education Category

For these questions, the results were average tending to a positive response (Table 22). The answers ranged from a slight disagreement to a moderate agreement with the statements presented. This indicates that neither educating nor reeducating the market seemed a devaluing criteria. However, in the second question, the response tended to be slightly higher due to the fact that some of the interviewed considered that teaching something new to a particular market or customer can be challenging.

The next two questions of this category, similarly to the previous two, pertained to the distinction between educating and reeducating the employee base, asking the interviewed if they believed:

Question 3 - The idea loses value if it involves employee education

Question 4 - The idea loses value if it involves the re-education of employees

	Average	Mode	Median	Standard Deviation
Question 3	3.7	3	3	1.19
Question 4	3.6	2	3	1.5

Table 23 - Statistical Results for Close-Ended Questions Number 3 and 4 in the Education Category

The results from these two questions were evidently negative (Table 23). Most of the interviewed stated that they do not believe the necessity of educating or reeducating employees devalues an idea. Some mentioned that this process may be difficult, and remarked that, in those cases, the time and resources allocated to the learning moment can negatively affect the performance in other activities or processes; however, the tendency was to associate these activities as non-devaluing ones in an idea.

The next question of this category pertained to the customer's involvement, asking the interviewed:

Question 5 - The idea loses value when the customer is involved in the development process

	Average	Mode	Median	Standard Deviation

Question 5	2.7	2	2	1

Table 24 - Statistical Results for Close-Ended Question Number 5 in the Education Category

This question obtained a significantly negative response, meaning the interviewed consider the customer's involvement a non-devaluing factor of an idea (Table 24).

The last question of this category pertained to the complexity of an idea, asking the interviewed:

Question 6 - The idea loses value the greater its development/implementation or execution complexity

	Average	**Mode**	**Median**	**Standard Deviation**
Question 6	5.1	5	5	0.94

Table 25 - Statistical Results for Close-Ended Question Number 6 in the Education Category

This particular question raised some debate, bringing the "cost-benefit" relation previously mentioned. Even though the answer average is positive, and the only negative answer was a slightly disagree (3), all interviewed mentioned the effect of the benefit of the idea alongside the costs, in relation to the complexity (Table 25). If an idea is very complex but of value, beneficial, with manageable costs and available resources, then it will be pursued, regardless of the complexity. However, if the idea is complex, demands employment of many resources and it is costly, then it may not be pursued.

Blocking

The first question of this category pertained to the entrance in the industry, asking the interviewed:

Question 1 - The idea loses value when entry barriers are high

	Average	**Mode**	**Median**	**Standard Deviation**
Question 1	5.7	5	5	0.9

Table 26 - Statistical Results for Close-Ended Question Number 1 in the Blocking Category

The answers to this question were consistently of positive value, which means all interviewed agreed that an idea may lose some of its value if it requires surpassing high entry barriers in the industry (Table 26).

The next question of this category pertained to market entrance, asking the interviewed:

Question 2 - The idea loses value when there is early resistance to market entry

	Average	Mode	Median	Standard Deviation
Question 2	5.9	6	6	0.7

Table 27 - Statistical Results for Close-Ended Question Number 2 in the Blocking Category

The answers to this question were consistently positive, which means all interviewed agreed that an idea loses some value when the market shows resistance (Table 27).

The following question of this category pertained to a conflict in establishing relationships with partners, asking the interviewed:

Question 3 - The idea loses value when the competition has a pre-existing relationship with critical partners

	Average	Mode	Median	Standard Deviation
Question 3	5.2	5	5	0.6

Table 28 - Statistical Results for Close-Ended Question Number 3 in the Blocking Category

This question registered a positive answer set (presented in Table 28), in which 9 out of the 10 interviewed agreed that trying to establish a relationship with a partner that is already committed to a competitor will devalue the idea (if the relationship is crucial).

The next question of this category pertained to the possible controversy of an idea, asking the interviewed:

Question 4 - The idea loses value when it is socially or politically controversial

	Average	Mode	Median	Standard Deviation
Question 4	5.7	6	6	0.9

Table 29 - Statistical Results for Close-Ended Question Number 4 in the Blocking Category

The general agreement was that an idea tends to lose value if it is controversial, regardless of the ramifications (Table 29). Something one of the interviewed mentioned was that, depending on the type of controversy generated, sometimes the situation can create publicity or attract a different type of market/ business, which could be something to consider as valuable.

The next two questions of this category pertained to blockages from competitors in the same type of business, asking the interviewed:

Question 5 - The idea loses value when the competition is doing the same or similar

Question 6 - The idea loses value when the competition is more influential in the area

	Average	Mode	Median	Standard Deviation
Question 5	4.3	6	4	1.35
Question 6	4.9	5	5	0.94

Table 30 - Statistical Results for Close-Ended Questions Number 5 and 6 in the Blocking Category

As it is possible to see in Table 30, the results for question number 5 are very dispersed. Though some of the interviewed moderately (6) believe that an idea would lose value his competitors were already doing it or something similar, others moderately and slightly disagree with the statement. The reasoning behind it was that the industry is already very competitive period therefore, it is normal to have ideas that fit in the same type of business that is already being done. Similarly, in the second question, most of the interviewed tended to answer in a similar way. Even though the set of answers to question number 6 is higher (almost a 5 - slight agreement), the general notion is that it is normal to have ideas that already fit in the type of business that is being done. However, in that same sense, question number six scored slightly higher due to the fact that, if competition is doing the same but establishes itself as more influential, then the idea may lose some of its value. Regardless, these two factors did not seem to be too significant in the idea evaluation.

The next two questions of this category pertained to blockage related to the execution of the idea, asking the interviewed:

Question 7 - The idea loses value when the competition has the means to block its development

Question 8 - The idea loses value when the competition has the means to block its implementation

	Average	Mode	Median	Standard Deviation
Question 7	5.9	6	6	0.83
Question 8	5.6	7	6	1.56

Table 31 - Statistical Results for Close-Ended Questions Number 7 and 8 in the Blocking Category

To both of these questions there was a consensus on the answer set (Table 31). In question number 7, all interviewed responded with slight to strong agreement (5, 6 and 7), except for one that remained neutral (4). It is possible to understand that an idea would lose value if the competition would block its development.

In the eighth question, similarly to the previous one, the answer set was also consensually positive; however, there was one answer placed out of the remainder (hence the high deviation value). In this particular case, the interviewed stated the specific case of ideas to be

implemented internally, which meant the influence of external blockage would be close to none.

The next question of this category pertained to response ability from the competition, asking the interviewed:

Question 9 - The idea loses value when there is a strong competitive response

	Average	Mode	Median	Standard Deviation
Question 9	4.5	5	5	1.02

Table 32 - Statistical Results for Close-Ended Question Number 9 in the Blocking Category

In this question, the answer set resulted in a neutral average, even though most responses were positive (Table 32). Most interviewed slightly agreed that a strong competitive response may devalue an idea. The views diverged between two points of view: similarly to what had been previous mentioned, it is natural for other companies to be intervening in the same areas or providing similar service offers, which means a competitive response is a given fact; but there is also the perspective that a strong competitive offer can prevent success, which is why most tended to incline to a slight agreement.

The last question of this category pertained to the ability to anticipate a competitive response from "big players" in the same field, asking the interviewed:

Question 10 - The idea has value when it is possible to anticipate a competitive response from companies with substantial resources

	Average	Mode	Median	Standard Deviation
Question 10	5.3	6	5.5	0.9

Table 33 - Statistical Results for Close-Ended Question Number 10 in the Blocking Category

The interviewed group tended to agree that an idea would have value if it allow for a prevention in terms of competitive response in the industry (Table 33).

Competitiveness

The first question of this category pertained to the competition's human resources, asking the interviewed:

Question 1 - The idea loses value when the competition has some of the best people in the field

	Average	Mode	Median	Standard Deviation

Question 1[5]	4.45	6	5	1.42

Table 34 - Statistical Results for Close-Ended Question Number 1 in the Competitiveness Category

In this question, most answers tended to be positive (Table 34); however, some of the interviewed stated that the people working currently at the organization are very capable as well, concluding that the general feeling is neutral (4) to positive (5). Also, they believe that having the best people from an area of expertise does not necessarily mean better outcomes; therefore, they consider that the idea may or may not lose value depending on the people working inside the company and for other organizations.

The next two questions of this category pertained to a larger scope of competition in terms of product/ service being provided, asking the interviewed:

Question 2 - The idea loses value when other companies in other industries are developing similar solutions/technologies

Question 3 - The idea loses value when it belongs to a very competitive area

	Average	**Mode**	**Median**	**Standard Deviation**
Question 2	3.9	2	4.5	1.64
Question 3	4	3	3.5	1.55

Table 35 - Statistical Results for Close-Ended Questions Number 2 and 3 in the Competitiveness Category

In question number 2, most interviewed stated that they disagree with the notion that product or service development in other industries would make an idea lose value (Table 35). This is due to the fact that, because the development is being done in a different industry, the solution may have different objectives, which ultimately means it may not be used for exactly the same purpose as a service or product that is being provided at the company.

Similarly to what has previously been mentioned, the interviewed group revealed themselves reluctant to agreeing that an idea would lose value because it is inserted in a competitive area in question number 3. IT in general is competitive, which means the company is already inserted in a competitive environment. Therefore, an idea would not lose value for it.

The last two questions of this category pertained to establishing a position in the industry, asking the interviewed:

Question 4 - The idea has value if it allows an agreement between the strongest competitors for common interests

[5] In question number 1 of the Competitiveness category, one of the interviewed flagged the No-Response (NR) answer. In this particular case, the interviewed stated that they consider the best people in the field to already be working at the company and, therefore, could not answer.

Question 5 - The idea has value if the competition intends to use it instead of creating an alternative

	Average	Mode	Median	Standard Deviation
Question 4[6]	5.34	6	6	1.15
Question 5	5.9	6	6	1.04

Table 36 - Statistical Results for Close-Ended Questions Number 4 and 5 in the Competitiveness Category

In question number 4, as seen in Table 36, the interviewed stated that they would see value in reaching an agreement with strong competitors for a common goal. In question number 5 the agreement was even more evident that an idea would have value if the competition would use it instead of pursuing their own alternative.

Exploration

The first question of this category pertained to an extension on the current offer, asking the interviewed:

Question 1 - The idea has value when it is an extension of a business/service that is already offered

	Average	Mode	Median	Standard Deviation
Question 1	5.9	6	6	0.54

Table 37 - Statistical Results for Close-Ended Question Number 1 in the Exploration Category

This question, as seen in Table 37, revealed a set of answers that was consistently positive, ranging from slight to strong agreement (5, 6 and 7). All interviewed revealed that an idea would have value if it could extend or compliment either the business, product, service or process that are already in place.

The second question of this category pertained to the existence of formal protection mechanisms, asking the interviewed:

Question 2 - The idea has value when formal mechanisms (patents, trademarks, etc.) are available to protect the business

	Average	Mode	Median	Standard Deviation
Question 2	5.6	6	6	1.11

[6] In question number 4 of the Competitiveness category, one of the interviewed flagged the No-Response (NR) answer. In this particular case, the interviewed stated that they wouldn't know what type of business could be arranged in that sense and, therefore, could not answer.

Table 38 - Statistical Results for Close-Ended Question Number 2 in the Exploration Category

Similarly to the previous result, as shown in Table 38, this question obtained a consensual set of positive results, in agreement with the notion that an idea would have more value if it could be protected by formal mechanisms in order to make it exclusive or inimitable.

The next question of this category pertained to the multitude of applications for one idea, asking the interviewed:

Question 3 - The idea has value when the company will have the opportunity to explore it in various ways

	Average	Mode	Median	Standard Deviation
Question 3	6.2	6	6	0.6

Table 39 - Statistical Results for Close-Ended Question Number 3 in the Exploration Category

The answers for this question were also extremely positive; the interviewed stated that the more potential an idea has of being explored through several paths, the more value it would hold (Table 39).

The next question of this category pertained to specific solutions, asking the interviewed:

Question 4 - The idea has value when it offers a specific solution/improvement for the company

	Average	Mode	Median	Standard Deviation
Question 4	6	6	6	0.63

Table 40 - Statistical Results for Close-Ended Question Number 4 in the Exploration Category

The standard response was positive, holding only answers of agreement (Table 40); this means that any idea that can offer a specific solution or improvement to a company problem has value. This also supports the previous notion that an idea should have a clear purpose.

The next two questions of this category pertained to exclusivity of the offer or relationship, asking the interviewed:

Question 5 - The idea has greater value the greater the exclusivity of the associated offer

Question 6 - The idea has greater value the greater the exclusivity of an associated (or possible) partnership

	Average	Mode	Median	Standard Deviation
Question 5	6.1	6	6	0.54
Question 6	5.6	6	6	0.8

Table 41 - Statistical Results for Close-Ended Questions Number 5 and 6 in the Exploration Category

In question number 5, as seen in Table 41, the set of answers was consistently positive, having all interviewed agree that an exclusive offer would allow for a more valuable idea. In question number 6, the set of answers was also consistently positive, only having two interviewed being neutral to the statement. This leads to a general conclusion that an exclusive partnership could hold value for the company.

The next two questions of this category pertained to positioning in the area, asking the interviewed:

Question 7 - The idea has greater value the more standard/standard it becomes in the area

Question 8 - The idea has value when it establishes a dominant position with critical customer groups in the area

	Average	Mode	Median	Standard Deviation
Question 7	5.1	6	5.5	1.22
Question 8	5.8	6	6	1.08

Table 42 - Statistical Results for Close-Ended Questions Number 7 and 8 in the Exploration Category

The set of answers for question number 7 was slightly dispersed, having some of the interviewed strongly and moderately agreeing with the statement (Table 42). However, three remained neutral (4) and one slightly disagreed (3). In that sense, there is not much value in becoming standard in the area; this was explained by some as not wanting to become “stuck” to a particular image in order to always have space for innovation and improvement.

The answers to question 8 were slightly more seamless. Most of the interviewed agreed that an idea offers value when it helps create a comfortable and strong positioning with the customer.

The next question of this category pertained to development additions to the current work, asking the interviewed:

Question 9 - The idea loses value when there is a need to develop several actions in parallel for its realization

	Average	Mode	Median	Standard Deviation
Question 9	4.4	4	4	1.02

Table 43 - Statistical Results for Close-Ended Question Number 9 in the Exploration Category

The answers to this question, as seen in Table 43, ranged from slight disagreement (3) to moderate agreement (6). Therefore, the results were mainly neutral, allowing for a conclusion that an idea that requires many parallel actions to be performed in order to succeed does not lose value.

The next two questions of this category pertained to past performance, asking the interviewed:

Question 10 – The idea has value when there is a successful track record in marketing in the same area

Question 11 - The idea loses value when, in the past, there was failure in the area

	Average	Mode	Median	Standard Deviation
Question 10	5.2	5	5	0.6
Question 11	4.6	5	5	0.66

Table 44 - Statistical Results for Close-Ended Questions Number 10 and 11 in the Exploration Category

The set of answers to question number 10 (presented in Table 44) were mainly of slight agreement (5), which reveals that an idea could have more value if the company has been successful in the same area in the past.

Ask your question 11, the results were mainly oh slight agreement (5) and neutral (4). This also allows for conclusion that, in the company, an idea will not lose or gain value for past failures in the area. One important message from one of the interviewed is that an idea would be explored if in the same area it had failed previously; however, it would not be pursued if it were repeating an old idea unless with new mechanisms to develop it.

The last three questions of this category pertained to insecurities in the exploration, asking the interviewed:

Question 12 - The idea loses value when it brings insecurities related to development

Question 13 – The idea loses value when it brings insecurities regarding integrity

Question 14 - The idea loses value when it brings insecurities related to data protection

	Average	Mode	Median	Standard Deviation
Question 12	5.1	5	5	0.7
Question 13	5.6	6	6	1.11
Question 14	5.9	6	6	0.94

Table 45 - Statistical Results for Close-Ended Questions Number 12, 13 and 14 in the Exploration Category

The set of answers to all three questions were mainly positive (Table 45). In question 12, most interviewed stated that they slightly agreed that an idea with insecurities in its development wouldn't be as valuable. In question number 13, the interviewed agreed that an idea would lose value if it brought the possibility of not maintaining integrity. Lastly, in question number 14, an idea would be less valuable if it involved insecurities regarding the protection of data (both from the company and from its clients).

Resources

The first three questions of this category pertained to the external acquisition of resources, asking the interviewed:

Question 1 - The idea has greater value the more it suits the company's resources

Question 2 – The idea has value when there is no need to acquire resources

Question 3 - The idea loses value when the resources needed are expensive

	Average	Mode	Median	Standard Deviation
Question 1	6.1	6	6	0.54
Question 2	5.9	7	6	1.14
Question 3	5.3	6	6	1.55

Table 46 - Statistical Results for Close-Ended Questions Number 1, 2 and 3 in the Resources Category

In question number one, the set of answers was consistently positive (Table 46). All interviewed agreed that an idea has more value when the resources that are present in the company are suited for its development. Ask for question number 2, the interviewed also maintained a positive response, having only two neutral responses. In this case, there is also a consensus that an idea holds value when there is no need to obtain resources. Lastly, for question number 3, there was a consensus in the set of answers for 9 out of the 10 interviewed; all interviewed stated that an idea would have less value if the resources needed for its development were expensive. One of the interviewed strongly disagreed with the statement, mentioning that the cost of the resources should not be an issue if the idea had value and if they were required to develop it.

The next question of this category pertained to the development of resources, asking the interviewed:

Question 4 - The idea loses value when the necessary resources have to be developed in-house

	Average	Mode	Median	Standard Deviation
Question 4	3.5	5	3	1.36

Table 47 - Statistical Results for Close-Ended Question Number 4 in the Resources Category

For the 4th question, as seen in Table 47, the results ranged from a strong disagreement (1) to a slight agreement (5) but having no neutral responses (4). This indicates that, even though the most common answer was positive, the interviewed that disagreed with the statement did it so strongly. This indicates that some believe there is lesser value in an idea that requires resources to be developed in house and others do not. However, by comparing the mode with the median, it is possible to understand that the answer set tends to be negative (having four positive responses and six negative). Therefore, the conclusion is that an idea does not lose value if the resources must be developed in house.

The next two questions of this category pertained to the composition of the involved teams, asking the interviewed:

Question 5 - The idea has value when the development team fulfills all HR needs

Question 6 – The idea has value when the assigned development team has superior skills to the competition

	Average	Mode	Median	Standard Deviation
Question 5	5.2	5	5	1.08
Question 6	5	6	5.5	1.34

Table 48 - Statistical Results for Close-Ended Questions Number 5 and 6 in the Resources Category

The answer set to question number 5 was positive; even though 3 out of the 10 interviewed remained neutral to the statement, the other 7 stated that the idea holds value when the development team is composed of all the required people (Table 48).

Concerning question number 6, the answer said was more dispersed. The answers ranged from slight disagreement (3) to strong agreement (7), revealing that some of the interviewed did not feel strongly about an idea having value because the team involved is some of the best in the field. As previously mentioned, some of the interviewed stated that having the best employees involved in an idea does not necessarily make it more valuable. Therefore, even though the response is mainly positive, the conclusion is that the effect of having a superior team in terms of quality does not necessarily make an idea more valuable.

The last question of this category pertained to the lack of resources, asking the interviewed:

Question 7 - The idea loses value when there are no resources needed to develop it

	Average	Mode	Median	Standard Deviation
Question 7	5.1	5	5	0.94

Table 49 - Statistical Results for Close-Ended Question Number 7 in the Resources Category

Lastly, in question number 7, the answer set revealed that there was a consensus in agreeing that the lack of resources for developing an idea makes it less valuable (Table 49).

Commercialization Costs

The first question of this category pertained to the ROI, asking the interviewed:

Question 1 - The idea has greater value the greater the return on investment

	Average	Mode	Median	Standard Deviation
Question 1	6.7	7	7	0.46

Table 50 - Statistical Results for Close-Ended Question Number 1 in the Commercialization Costs Category

Perhaps the most consensual set of answers, question number 1 was responded by moderate and strong agreement only (Table 50). In this case it is evident that an idea holds greater value if the return on investment is higher.

The next question of this category pertained to the commercialization quality, asking the interviewed:

Question 2 - The idea has value when there is the necessary skill in the company for its commercialization

	Average	Mode	Median	Standard Deviation
Question 2	6.3	6	6	0.46

Table 51 - Statistical Results for Close-Ended Question Number 2 in the Commercialization Costs Category

Similarly to the previous question, the answer set for question number 2 was also extremely positive ranging only for moderate to strong agreement as well (Table 51). However, comparing to the previous question, the return on investment has greater value than the ability for commercializing the idea. Nonetheless, the capacity for commercializing it is also very valuable.

The next question of this category pertained to the market entrance, asking the interviewed:

Question 3 - The idea has value when it allows the gradual entry into the market (from a small to a larger one)

	Average	Mode	Median	Standard Deviation
Question 3	5.5	6	6	1.12

Table 52 - Statistical Results for Close-Ended Question Number 3 in the Commercialization Costs Category

For this question the answer said was also positive (Table 52). With three neutral responses, it is still possible to convey that a gradual market interest is of slight value in an idea.

The last question of this category pertained to alliances for marketing activities, asking the interviewed:

Question 4 - The idea has value when it is possible to identify companies prepared to engage in joint marketing efforts

	Average	Mode	Median	Standard Deviation
Question 4	5.5	6	6	1.03

Table 53 - Statistical Results for Close-Ended Question Number 4 in the Commercialization Costs Category

The answer set for question number 4 was also very positive (Table 53). However, one of the interviewed said that he slightly disagreed with the statement, considering there was no need

to establish a marketing partnership. Nonetheless, the answer set was almost exclusively positive, which means a joint marketing effort could bring value to an idea.

Development Costs

The first two questions of this category pertained to clear success criteria, asking the interviewed:

Question 1 - The idea has value when it is possible to distinguish successful paths from failure paths

Question 2 - The idea has value when the criteria for the success of its development are clear

	Average	Mode	Median	Standard Deviation
Question 1	6	6	6	0.45
Question 2	6.2	6	6	0.4

Table 54 - Statistical Results for Close-Ended Questions Number 1 and 2 in the Development Costs Category

Both of these questions obtained an exclusively positive answer set (Table 54). From this notion it is possible to conclude that distinguishing paths of success and failure and ascertaining the criteria for success in an idea is of great value.

The next question of this category pertained to process development, asking the interviewed:

Question 3 - The idea has value when it involves/develops efficient processes

	Average	Mode	Median	Standard Deviation
Question 3	5.8	6	6	0.87

Table 55 - Statistical Results for Close-Ended Question Number 3 in the Development Costs Category

The answer set to question number 3 was a very positive one as well (Table 55); 9 out of the 10 interviewed rated the statement from slight to strong agreement (5, 6 and 7) and one other interviewed remained neutral (4). Therefore, it is possible to conclude that an idea that allows for the development of more efficient processes is valuable.

The next question of this category pertained to financial aids, asking the interviewed:

Question 4 - The idea has value when it is associated with external financial support

	Average	Mode	Median	Standard Deviation
Question 4	4.2	6	4.5	1.66

Table 56 - Statistical Results for Close-Ended Question Number 4 in the Development Costs Category

The answer set for question number 4 was not seamless (Table 56); the answers ranged from strong disagreement (1) to moderate agreement (6), which set the average on a neutral

response (4). 50% of the interviewed offered a positive response; for the remaining half, 2 were neutral (4) and the other 3 strongly, moderately and slightly disagreed with the statement. Therefore, it is possible to conclude that the external financial support is neither valuable nor invaluable.

The last question of this category pertained to financial obstacles, asking the interviewed:

Question 5 - The idea loses value when it requires overcoming many financial obstacles during its development

	Average	Mode	Median	Standard Deviation
Question 5	5.4	6	6	1.11

Table 57 - Statistical Results for Close-Ended Question Number 5 in the Development Costs Category

The answers to question number 5 were mostly positive (Table 57). At the exception of a slight disagreement and a neutral stance, all other interviewed addressed the statement positively. Therefore, it is possible to assume that financial obstacles throughout the development of the idea are a devaluing factor.

Spillover

The first two questions of this category pertained to cost and income, asking the interviewed:

Question 1 - The idea has value when it allows to reduce the cost of the current product(s)/service(s)

Question 2 - The idea has value when it allows to increase the value of the existing offer(s)

	Average	Mode	Median	Standard Deviation
Question 1	5.8	6	6	1.25
Question 2	6.1	6	6	0.54

Table 58 - Statistical Results for Close-Ended Questions Number 1 and 2 in the Spillover Category

The answer set for question number 1 was positive (Table 58). Although there was a slight disagreement (3) and a neutral (4) stance, the remaining interviewed moderately and strongly agreed with the statement. The ones that did not positively answer the question explain that cost reduction does not always resonate with higher sales or income, and with better quality.

In question number 2, the answers were all positive, combining in a moderate agreement that an idea that allows for an increase in the value of the existing offer is valuable itself.

The next question of this category pertained to the effect on other activities, asking the interviewed:

Question 3 - The idea has value when it allows to facilitate the development of other actions that are showing poor results

	Average	Mode	Median	Standard Deviation
Question 3	5.8	6	6	0.87

Table 59 - Statistical Results for Close-Ended Question Number 3 in the Spillover Category

Question number 3 had almost all answers positive and a single neutral (Table 59). By considering all the answers it is possible to conclude that an idea that allows the improvement of other actions inside the company with poor results is valuable.

The next two questions of this category pertained to knowledge building, asking the interviewed:

Question 4 - The idea has value when its development allows to increase knowledge in a crucial new area

Question 5 - The idea has value when it allows the creation of know-how and the development of advantageous skills, even after the end of the project

	Average	Mode	Median	Standard Deviation
Question 4	5.6	6	6	0.8
Question 5	5.8	6	6	0.6

Table 60 - Statistical Results for Close-Ended Questions Number 4 and 5 in the Spillover Category

Both answer sets for questions number four and five are positive end lead to the conclusion that there is value in an idea that can increase knowledge, and there's value in an idea that generates know how for present or future endeavors (Table 60).

The next question of this category pertained to the company’s reputation, asking the interviewed:

Question 6 - The idea has value when it improves the company's overall reputation

	Average	Mode	Median	Standard Deviation
Question 6	6	6	6	0.78

Table 61 - Statistical Results for Close-Ended Question Number 6 in the Spillover Category

The set of answers for question number 6 was positive throughout indicating that improving the overall reputation of the company is valuable (Table 61).

The next question of this category pertained to changes in environment, asking the interviewed:

Question 7 - The idea has value when it increases the ability to react to abrupt or significant changes

	Average	Mode	Median	Standard Deviation
Question 7	5.6	5	5.5	0.92

Table 62 - Statistical Results for Close-Ended Question Number 7 in the Spillover Category

The set of answers for question number 7 was uniform throughout including only one neutral response (4) amongst all the slight to strong agreement (5, 6 and 7). The results appeared to show that having the ability to react to abrupt changes brings value to an idea (Table 62).

The last question of this category pertained to the danger of sabotaging an existing offer, asking the interviewed:

Question 8 - The idea loses value when it creates a danger of cannibalizing existing product(s)/service(s)

	Average	Mode	Median	Standard Deviation
Question 8	5.5	6	6	1.2

Table 63 - Statistical Results for Close-Ended Question Number 8 in the Spillover Category

This answer said entailed different considerations about the same question (Table 63). Most interviewed thought of an idea killing a current product or service as a negative occurrence; This group agreed with the statement that an idea like this would not be of value. However, two of the interviewed considered that if this were to happen, it would only be negative if the idea did not substantiate the same revenue as the offer that it was killing. Otherwise, if the value of the new idea surpassed the value of the previous one, it would be a positive outcome. Therefore, one of the interviewed remained neutral and the other rated the statement with a slight disagreement.

External Uncertainty

In this section, all statements concerned different types of external uncertainties:

Question 1 - The idea loses value when the associated search is uncertain

Question 2 - The idea loses value when the revenue stream generated is uncertain

Question 3 - The idea loses value when the speed of approval by external regulatory bodies is uncertain

Question 4 - The idea loses value when the speed with which the products will be accepted in the market is uncertain

Question 5 - The idea loses value when the availability of necessary parallel technologies is uncertain

Question 6 - The idea loses value when the profits generated can be controlled by third parties (governments, distribution channels, unions, etc.)

Question 7 - The idea loses value when constant adjustments are needed (by external influence)

Question 8 – The idea loses value when competition's developments are unknown

	Average	Mode	Median	Standard Deviation
Question 1	5.5	5	5.5	0.81
Question 2	5.3	5	5	0.78
Question 3	5.7	6	6	0.64
Question 4	5.4	6	5.5	0.66
Question 5	5.5	6	5.5	0.5
Question 6	5.4	6	6	1.36
Question 7	5.3	6	6	1.01
Question 8	4.5	3	4.5	1.29

Table 64 - Statistical Results for Close-Ended Questions Number 1, 2, 3, 4, 5, 6, 7 and 8 in the External Uncertainty Category

As seen in Table 64, both question number 1 and question number 2 resulted in positive answer sets. This means that most of the interviewed acknowledged that an idea is less valuable if it cannot certainly pinpoint the market search and the estimated generated revenue stream.

Question number 3 resulted in and answer set very positive and seamless. This means that the interviewed acknowledged that the speed of approval given by external regulatory bodies may decrease the value of the idea (the uncertainty as well as a slow response).

The fourth question also registered a positive answer set. An idea that cannot be clear about its estimated acceptance in the market loses value.

Question number 5, similarly to the first two questions, registered a positive answer set. From this result it is possible to conclude that an idea tends to be less valuable if there is no guarantee of availability of needed technological resources.

the results for question number 6 we're also very positive. However, the deviation is high because one of the interviewed moderately disagreed (2) with the statement. They did not believe that losing control of generate profits to third parties involved would be devaluing, considering they would have to have an involvement to do so.

Question 7 also generated some debate, even though most interviewed gave it a positive response. One of the interviewed slightly disagreed (3) that required adjustments wouldn't be a devaluing factor, considering they may be normal during any stage of the development process. Nevertheless, it is possible to see some resistance to the statement, leading to the conclusion that constant adjustments are slightly devaluing (by external force).

Lastly, in question number 8, the answer set was very dispersed; the answers ranged from a slight disagreement (3) to a strong agreement (7). Because, as previously mentioned, competition is expected in the industry, the interviewed showed, generally, some concern, but not gravely. Therefore, the results seem to lead to the conclusion that an idea does not lose value just because the competition's work is unknown.

Internal Uncertainty

The first three questions of this category pertained to financial aspects, asking the interviewed:

Question 1 – The idea loses value when the cost of development is uncertain

Question 2 – The idea loses value when the return value is uncertain

Question 3 - The idea loses value when resource costs are uncertain

	Average	Mode	Median	Standard Deviation
Question 1	5.4	6	5.5	0.92
Question 2	5.4	5	5.5	1.02
Question 3	5.2	5	5	1.17

Table 65 - Statistical Results for Close-Ended Questions Number 1, 2 and 3 in the Internal Uncertainty Category

As seen in Table 65, in the first question there was a general agreement with this statement amongst all interviewed. This means that, when the costs of the development of an idea are not certain, the idea is slightly devalued.

As for the second question, the set of answers was mainly positive with one slight disagreement. This leads to the conclusion that their return on investment is important and, therefore, when an idea presents an uncertainty regarding this factor, it can be devalued.

Question number 3 presented, similarly to the second question, in mainly positive set of answers with one slight disagreement as well. This means that an idea can be devalued if the costs surrounding the resources are uncertain.

The next question of this category pertained to the development capabilities, asking the interviewed:

Question 4 – The idea loses value when the capabilities required for development are not found in the company

	Average	Mode	Median	Standard Deviation
Question 4	4.6	5	5	1.2

Table 66 - Statistical Results for Close-Ended Question Number 4 in the Internal Uncertainty Category

The set of answers for question number 4 was dispersed (Table 66); the answers ranged from moderates agreement to moderate agreement. Generally speaking, the results tended to be positive. However, the conclusion may be that an idea does not gain or lose value if the required capabilities for the idea development are not found in the company.

The last questions of this category pertained to general internal uncertainties, asking the interviewed:

Question 5 – The idea loses value when the availability of the necessary resources is uncertain

Question 6 – The idea loses value when the ability to overcome obstacles is uncertain

Question 7 – The idea loses value when the duration of development is uncertain

Question 8 – The idea loses value when senior management commitment is uncertain

	Average	Mode	Median	Standard Deviation
Question 5	4.7	5	5	1.27
Question 6	4.7	5	5	0.9
Question 7	5.4	6	6	0.8
Question 8	5.4	5	5	0.66

Table 67 - Statistical Results for Close-Ended Questions Number 5, 6, 7 and 8 in the Internal Uncertainty Category

As shown in Table 67, question number 5 had a disperse set of answers, ranging from a moderate disagreement (2) to a moderate agreement (6). Even though the general notion is that there is a slight agreement towards an idea losing value when the availability of the resources is not certain, the results seem neutral, which means an idea does not gain nor lose value because of this factor.

The set of answers for question number 6 is mostly positive. Although there is a slight disagreement (3), the general figure is that the answers are predominantly positive; therefore, the idea may lose some value if the ability to surpass obstacles in unclear.

In question number 7 the set of answers is predominantly positive, being possible to conclude that the idea is devalued if the development's timeline is uncertain.

Lastly, question number 8 has a convergent set of answers, all positive. This means that all interviewed agree that without the clear support of senior management, the idea may lose some of its value.

APPENDIX H: Idea Workflow

