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Mestrado em Engenharia de Serviços e Gestão

Exploring the Application of Service Design Methodologies in the Design of an Innovation Management System

Filipa Marques de Aguiar Lopes Pinto

Master Thesis

Supervisor at FEUP: Prof. João Claro

Supervisor at E-goi: Ivo Pereira

U.PORTO

FEUP FACULDADE DE ENGENHARIA
UNIVERSIDADE DO PORTO

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To my family

Abstract

Innovation is present everywhere. Within a company it can be challenging to understand where it stems from, what may trigger it and how to take full advantage of it. This dissertation aims at contributing to a better understanding of how a company innovates and how to better structure the innovation efforts of a growing company in the IT sector.

The study was performed in an IT company that develops and commercializes a marketing automation software, provided as software as a service. Its accelerated growth, competitive market and long-term goals have made it realize the importance of Research, Development and Innovation (RDI).

As such, the study starts out by understanding the complexity of the innovation efforts of the company, comprehending its actors, activities, systems and interfaces between departments, through semi-structured interviews.

By understanding that innovation is not solely focused on the RDI department but that all departments participate in innovation activities, a high level framework was devised in order to map and manage all RDI related avtivities. Its elements were deconstructed and prioritized according to the value they offered to the company and their relevance upon implementarion. The multilevel service design methodology was utilized to develop a new idea management service that could capture, evaluate, process and communicate innovative ideas while transforming them into viable innovative projects that will bring value to the company.

From the study it was clear to understand the importance of knowledge dissemination in order to keep a company continuously innovative. As well as the idea management activities that would improve upon the company's innovation outcomes (product, process, marketing and organizational).

Keywords: Innovation management system, service design, multilevel service design, idea management service.

Resumo

A inovação está presente em todo o lado. Dentro de uma empresa pode ser um desafio compreender de onde provém, o que a pode desencadear e como tirar o máximo partido da mesma. Esta dissertação visa contribuir para uma melhor compreensão de como uma empresa inova e de como estruturar melhor os esforços de inovação de uma empresa em crescimento no sector das TI.

O estudo foi realizado numa empresa de TI que desenvolve e comercializa um software de automação de marketing, oferecido como software as a service. O seu crescimento acelerado, mercado competitivo e objetivos a longo prazo levaram-na a perceber a importância da Investigação, Desenvolvimento e Inovação (IDI).

Como tal, o estudo começa pela compreensão da complexidade dos esforços de inovação da empresa, abrangendo os seus atores, atividades, sistemas e interfaces entre departamentos, através de entrevistas semiestruturadas.

Partindo do entendimento de que a inovação não se concentra apenas no departamento de IDI, mas que todos os departamentos participam em atividades de inovação, foi concebido um quadro conceptual de alto nível para mapear e gerir todas as atividades relacionadas com a IDI. Os seus elementos foram desconstruídos e priorizados de acordo com o valor que ofereciam à empresa e a sua relevância na implementação. A metodologia multilevel service design foi utilizada para desenvolver um novo serviço de gestão de ideias que pudesse captar, avaliar, processar e comunicar ideias inovadoras, transformando-as simultaneamente em projetos inovadores viáveis que trarão valor à empresa.

Do estudo ficou clara a importância da disseminação do conhecimento para uma empresa se manter continuamente inovadora, assim como das atividades de gestão de ideias para melhorar os resultados da inovação da empresa (produto, processo, marketing e organização).

Palavras-Chave: Sistema de gestão de inovação; design de serviços, *multilevel service design*, serviço de gestão de ideias.

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List of Abbreviations

AI	Artificial Intelligence
CVC	Customer Value Constellation
DSR	Design Science Research
KPI	Key Performance Indicator
MSD	Multilevel Service Design
NPD	New Product Development
NSD	New Service Development
OECD	Organization for Economic Co-operation and Development
OKR	Objectives and Key Results
PM	Project Manager
R&D	Research and Development
RDI	Research, Development and Innovation
SEB	Service Experience Blueprint
SIFIDE	Sistema de Incentivos Fiscais à I&D Empresarial
SSA	Service System Architecture
SSN	Service System Navigation
TRL	Technology Readiness Level
TRM	Technology Road Mapping

1   Introduction

This chapter starts by providing context to the background where the study was developed and its inherent problems. The research question is presented and the overall outline of the dissertation featured.

1.1   Background and Problem Description

This study was developed in a Portuguese company, E-goi, that operates on a software as a service business model, providing an omnichannel marketing automation platform that enables companies to manage their digital marketing needs.

In recent years E-goi has experienced a rapid growth both in sales and in human resources. As part of its constant quest for sustainable competitive advantage, a research development and innovation department was created. This new and ever-changing department required the development of new processes and the adjustment of others. As the RDI department sought opportunities for innovating some barriers restrained the sustainable growth of the department and the company as a whole. Understanding how the innovation activities run through the company proved to be essential. As referenced, the company's tendency is for continuous growth, thus proving the need to prepare for the foreseen changes. With its RDI department E-goi aims to enter new markets and introduce new products into its portfolio, namely using machine learning.

In an industry where the competition is fierce, in constant change (due to rapid technology advancements), and with a growing trend of transparency of information, having unique elements is ever more important to achieve differentiation from competitors. These elements can be quite complex to achieve and sustain, as is the case of the creative and innovative capability of a company.

Understanding these factors – *business growth, investment in product/service innovation, optimization of internal resources* – E-goi felt the need to explore and analyze the company's innovation model as well as its processes across all departments, in order to optimize it while adapting to the ever-changing business reality. Therefore, the opportunity for this project arose, leading to the formulation of a project with its principles rooted in service innovation applied for the benefit of the company.

The key point of the company's problem is the challenge that lies in developing an innovation process, since there is no "one size fits all" model, and in an ever changing environment the company must be able to adapt and evolve over time.

1.2   Research Question and Approach

The main purpose of this study is to understand how the innovation efforts span through the company, by knowing its actors, activities, systems and interactions between them. Identifying these elements will portray a current picture of what the innovation efforts and its impacts upon the outcomes of the company are. Another objective is to identify improvement opportunities and mitigate/solve them when possible. To understand the scope of the study and adjust it to the company's needs, an assessment of the value each element brings to the innovation efforts

must be considered in order to explore the design of an innovation management system and how it may be applied with service design methodologies.

Accordingly, the study seeks to address the following research question and sub dimensions:

RQ1: How can service design methodologies be useful in exploring the innovation efforts of the company in the fast-paced IT market?

RQA: What are the innovation management system elements that bring most value to the company?

RQB: How can the multilevel service design be incorporated in order to map elements of an innovation management system?

1.3   Dissertation Structure

This dissertation is composed of seven chapters and structured according to the way the work was executed. The introductory chapter offers a brief presentation of the background and problem addressed in this dissertation as well the research questions the work proposes to answer.

The second chapter offers a summary of the understanding in the literature of innovation and its elements, describes different innovation models, the factors that influence a company's innovative capabilities, and reviews the essential aspects of service innovation.

The following chapter, dedicated to the methodology, features a description of the research method, with the justification for its selection and its applicability within the context of the dissertation.

The fourth chapter describes the study context, by presenting an overview of the company and a more detailed description of its aspects that are relevant for the study. It is based on the interviews and observations performed, and divided in three sections: the research context presents the company at a higher level and the second section describes the current state of the RDI department, while the third section elucidates the global innovation efforts of the company.

The fifth chapter presents the problems addressed by the study, taking into consideration the analysis of chapter 4 as well as the reviewed literature. The chapter establishes in greater detail the study's scope and objectives.

In the following chapter the solutions for the problems identified in chapter 5 are presented, aiming at mitigating and potentially eliminating most of the problems identified by presenting an RDI activities model and developing service design methodologies to an idea management service.

Finally, chapter 7 is devoted to the presentation of conclusions of the research performed, as well as expressing recommendations for future work.

2 Literature Review

This chapter aims at setting the context to the topics approached throughout the thesis. As the focus is innovation, the chapter starts out by profiling what the literature describes as innovation and sectioning it into the types of innovation. Next, the innovation dimensions are contextualized according to their levels of novelty, followed by the presentation of the different methodologies and how they relate to the surrounding ecosystem. In order to frame the complexity of the subject, a description of what the literature regards as innovation management is provided. The chapter then proceeds to describe and compare different types of innovation models, as they have evolved in time, and identify the main factors influencing a company's innovation capabilities.

Finally, an introductory overview of service innovation is presented, reviewing the topics of new service development, service development and multilevel service design.

2.1 Innovation

2.1.1 What is Innovation

Contrary to common knowledge, from the beginning, innovation was seen as having more dimensions than simply product development. The first scholar to publicly define innovation was Schumpeter in the late 1920s, stating that innovation is the creation of something new, new goods/services, new methods of production, new sources of supply or new organizational structures. All in all, Schumpeter understood innovation as doing things differently (Crossan & Apaydin 2010).

Over the years the definition of innovation has evolved and been discussed at length. Eveleens (2010) defines it as a successful exploitation of new ideas, while Veryzer (1998) does not necessarily restrict innovation to "it" being successful, characterizing it simply as the creation of something new (product, service or process). Another take on innovation is the definition presented by Fagerberg et al. (2005) stating that it is the creation of something qualitatively new, a change that might lead to new performance and outcomes. Hidalgo & Albors (2008) understand innovation to be more than an action, involving the interaction and sharing of knowledge between different stakeholders.

As it is understood, innovation is regarded as a source of competitive advantage in any sector, but it becomes a critical element mainly in rapid changing segments. As such, innovation needs to be understood as a continuous process for market growth. Varella et al. (2012) explain that to maintain or create competitive advantage one has to continuously innovate since the success of innovation is not perpetual and its returns will decrease over time. Tidd & Bessant (2018) reinforce the importance of continuous innovation by stating that competitive rivalry provides the needed incentive for innovation.

From a company's perspective, according to Abernathy & Utterback (1998), the take on innovation changes according to the company's maturity (cit. in Veryzer, 1998). As such, Tidd & Bessant (2018) explain that, to use innovation to enhance competitiveness, a different set of managerial skills (and knowledge) is required (different from everyday business administration).

There is some dispute amongst scholars on the difference between invention and innovation Varella et al. (2012) explain invention as the development of something new while innovation only happens when the idea is put into practice. According to Schumpeter (1971) an invention does not necessarily lead to innovation; it only transforms into innovation when it is introduced to the market (cit. in Barbieri, 2003). Barbieri (2003) adds that while an invention is something purely technical, innovation is simultaneously technical, economical and organizational.

2.1.2 Types of Innovation

The Oslo Manual exhibits the four types of innovation currently accepted by the OECD: product/service innovation, process innovation (that are closely related to technology innovation), and marketing and organizational innovation (cit. in OECD, 2005).

Product Innovation

Product innovation is the introduction of a new good or service substantially improved on the accounts of its characteristics or proposed usage. The substantial improvements may be technical specifications, components, materials, incorporated software, ease of use as well as others. As previously stated, the Oslo Manual understands the term "product" as comprising both goods and services.

Innovative products are goods or services that significantly differ in their characteristics or in their expected use. However, conceptual changes to the product that do not require significant changes to the functional characteristics or their use are not product innovations. But they can be other types of innovations such as marketing depending on the case (OECD, 2005).

Process Innovation

Process innovation, according to the Oslo Manual (OECD, 2005), is the implementation of a new method of production or distribution that is new or significantly improved. Tidd and Bessant (2018) simplify this definition by stating that it concerns changes in the ways in which they are created and delivered.

OECD (2005) considers as significant changes in the process activities such as techniques, equipment and/or software. Process innovation strives to reduce production and/or distribution costs, improve quality, and produce or distribute new products. The implementation of new or significantly improved information technologies is also considered a process innovation if it strives to improve the efficiency and/or the quality of a support activity.

Marketing Innovation

The Oslo Manual explains marketing innovation as the implementation of a new marketing method. This new method must comprise significant changes in the product conception, packaging, positioning, promotion or pricing methods. The innovations derived from marketing innovation are consumer driven, and can, in certain occasions, lead to new markets or product rebranding/repositioning, with the intent of a sales increase (OECD, 2005).

The new marketing method can either be developed by the innovative company or adopted from other companies, and marketing methods can be implemented for both new or existing products. On the other hand, according to the Oslo Manual seasonal changes are not considered marketing innovations, unless they involve marketing methods not previously used by the company (OECD, 2005).

Organizational Innovation

OECD (2005) refers to organizational innovation as the implementation of a new organizational method in the company's business practices, workplace organization or external relations. They aim to improve the performance of a company, by stimulating workplace satisfaction and productivity. Organizational innovation can be divided into three types: business practices, workplace organization, and external relations.

The creation of managerial strategies is not considered an organizational innovation. However, organizational changes implemented as part of a new strategy might be considered an innovation if they are being implemented for the first time and are significantly new and innovative (OECD, 2005).

With a different view Tidd and Bessant (2018) consider four different types of innovation calling them the 4P's: product innovation, process innovation, positioning innovation and paradigm innovation. According to the authors, position innovation takes place when there are significant changes in how the product or service are introduced to the market, while paradigm innovation entails a considerable change in the mental models of what the organization does.

2.1.3   Innovation Dimensions

After understanding the different types of innovation, it is key to understand its dimensions. With different innovations there are different degrees of novelty. Tidd & Bessant (2018) explain that the novelty of an innovation can range from minor improvements, to incremental and all the way up to radical changes. Veryzer (1998) explains the concept further, by clearly stating that there are two types of innovation. Continuous innovation represents all incremental innovation processes that add "something" to an already created element. The other type of innovation presented by the author is discontinuous innovation, originating in the understanding that NPD projects are rarely comprised in the continuous innovation realm. This concept is defined by the creation of radical or discontinuous new products or services that will alter the firm's growth as well as the markets it is involved in, even creating new ones.

Marques & Abrunhosa (2005) explain continuous innovation as a result of three types of processes: learning by doing, learning by using or learning by interacting. Adding that even though they might not have as large an impact as discontinuous innovation, when both types of innovation are combined, continuous innovation can have a significant influence on a company's productivity and growth. Davila et al. (2012) add that incremental (continuous) innovation is a strategy to extract the maximum value from a company's products/services without the need for radical changes or investments. Drucker (1987), as shown in Silva et al. (2008), states that continuous innovation can be the starting point for major (discontinuous) innovations, creating long-term competitive advantages. Silva et al. (2008) conclude that discontinuous or radical innovation is mainly generated by R&D activities, which usually also demand a higher investment from a company.

2.1.4   Innovation Methodologies

Having understood the types and dimensions of innovation it is important to refer to the innovation methodologies, the most common and understood of which are open innovation and closed innovation. Closed innovation refers to situations in which all the development and

marketing of new products or services takes place within the boundaries of the company. This methodology works like a funnel where all the resources are introduced into the funnel of development, and innovations come out through the other end (Grönlund et al., 2010). Chesbrough (2003) popularized the open innovation concept, describing it as the theory that understands that ecosystems should be open, since not all good ideas will necessarily come from inside the company, nor do they need to be developed/commercialized by the company that had the ideas in the first place. Later Chesbrough & Bogers (2014) add that open innovation is a way of accelerating internal innovation by taking advantage of the knowledge of external markets. Many companies burn out all their internal innovation sources, showing the true benefits and importance of open innovation. The same authors label the over consumption of the innovation sources as "erosion factors", undercutting the logic of closed innovation. Tao & Magnotta (2006) state the importance of putting in place strategic partnerships when implementing open innovation in order to not deplete innovation sources. Witzeman et al. (2006) note that an important challenge for companies seeking to harvest the benefits of open innovation lies in changing their core capabilities and processes in order to fit the principles of open innovation.

2.2   Innovation Management

The study of innovation management has been increasing in the past decade. For long an empirical art, Cohn (2013) explains that it is currently evolving into a scientific field of its own, using objective data, tested methodologies as well as a formal evaluation of results. Crossan & Apaydin (2010) express their concern for the field, stating that the diversity of innovation management challenges, structure and processes have disseminated in such a way that a vast variety of innovation management systems exist and are largely fragmented and not well founded (in the theory), as well as not tested enough.

Kelly & Kranzburg (1978) point out that the main goal of innovation management is to allow an organization to better react to internal and external opportunities through the use of creative efforts by introducing innovative ideas, processes and products to the company. Myers & Marquis (1969) add that it is not an isolated act, but an integrated process, with all the new and old ideologies interacting in a coordinated fashion. Cohn (2013) simplified prior views by proposing that innovation management is the management of the innovation processes, the monitoring and documentation of change within the organization. The Oslo Manual states that innovation management concerns the activities related to the capture, use and share of knowledge through the organization, adding that the right innovation management system can improve the company's competitiveness and innovation capabilities (OECD, 2005).

In order to be effective and useful, an innovation management system needs to be properly implemented, as well as use rigorous tools, while being simple and adapted to the. Crossan & Apaydin (2010) state that it is only possible to deliver a quality innovation management system in quantifiable activities. As Hidalgo & Albors (2008) explain, this allows decreasing the uncertainty and unpredictability of innovation. Supposing that there is no innovation management system in place, Maier, et al. (2012) show that innovation will continue to occur, but in an un-potentiated and almost accidental fashion.

2.3   Innovation Models

There has been a growing concern with introducing conceptual order into innovation processes in order to better understand the dimensions and facets of innovation as well as to provide a baseline for a clear policy formulation. It is relevant to note that a model should be adapted to a company's innovation needs, culture and current processes. Explaining that innovation is complex, uncertain, disorderly and in constant change, Kline & Rosenberg (2010) warn that innovation processes are not linear or smooth and should not be represented as linear or smooth models.

2.3.1   The Linear Model

From the second world war until the mid 80's innovation had been thought of as a linear process, called the Linear Model by most authors. The model starts out with research, carries on into development, then production and finishes with marketing. As stated above and by many authors, innovation is not a smooth one-way process, thus the intense criticism of Kline & Rosenberg (2010) of the model by considering that it distorts the reality of innovation in numerous ways. Firstly, the authors raise the issue of the absence of feedback from the actors within the process (which they consider to be an inherent path of an innovation/development process). Secondly, they point out that innovation neither needs to, nor does it always derive from research. Even though the flaws and limitations of the linear model are widely understood, Marques & Abrunhosa (2005) state that it is still present in the subconscious of several companies.

2.3.2   Chain-Linked Model

Later, innovation processes started to be understood as complex interaction processes, taking into consideration the different agents and the innovation process stages. The new model that emerged shows the innovation activities being determined and shaped by the market. The chain-linked model, first illustrated by Kline and Rosenberg in 1986, illustrates this new way of thinking. In the model, presented in Figure 1, there are five innovation paths represented as explained by Kline & Rosenberg (2010) as well as Marques & Abrunhosa (2005).

The first innovation path is the central chain-of-innovation with its starting point in the detection of a potential market. The path is marked as C in Figure 1. The feedback path, represented by the F and f links, represents several processes of improvement and refinement occurring through feedback.

The accumulated knowledge path (marked as K and R) expresses the understanding that the general use of science occurs in two stages, the known (stored) knowledge, and when needed, science research. This combination of knowledges is called modern science. Radical innovations are represented in the fourth path, which the authors explain to be a rare occurrence, but one that can create new markets and alter a firm's growth drastically. The path is marked as D. The final path represents the feedback from the innovative products to science (marked as I).

In sum, Marques & Abrunhosa (2005) show that the chain-linked model represents the innovation process model for companies where innovative capabilities lie within the company itself. However, the way the process is implemented and evolves changes from company to company as well as from project to project, evoking once more that innovation is not linear.
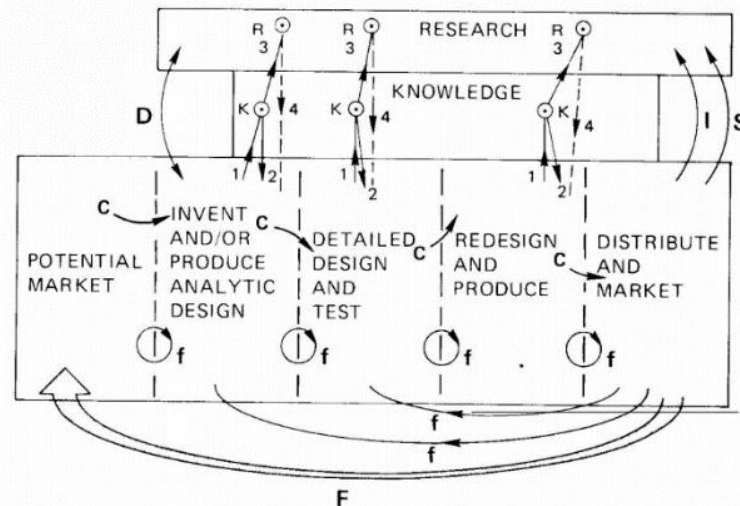
Figure 1 - Chain Linked Model (Kline & Rosenberg, 2010)

2.3.3 Chain Interaction Model

As the innovation paradigm continues to evolve new models are created. The latest revision of the Oslo Manual shows the need to include the diversity of actors in the enterprise's context and consider the complex facets of learning (technological, organizational and commercial) (OECD, 2005).

In the chain interaction model, presented in appendix A, companies are viewed as the decisive actors in the innovation process. As explained by COTEC (2010) in the Good Practices for Innovation Management Manual, this model is mainly concerned with the chain of interactions between the core capabilities of a company and the capabilities of the actors within its ecosystem. To establish the boundaries of the capabilities three interfaces are presented where economically enhancing knowledge circulates and is transferred between the different actors of the model's ecosystem (Caraça et al., 2009) (cit. in COTEC, 2010). The authors explain that these interfaces may assume the format of an innovation department or be concentrated in an innovation manager figure. Interfaces are not a new concept, e.g., Rothwell et al. (1974) illustrate that the speed of change in technological markets gives competitive advantage to companies that are able to be agile and open to innovation, making it key to have well established interfaces with science and users.

Similar to the Kline and Rosenberg chain-linked model, the process of innovation may stem from a potential market need, and Caraça et al. (2009) relate the chain interaction model to the previous model by showing that knowledge can be available internally or be acquired externally (cit. in COTEC, 2010). As stated by COTEC (2010), the innovative company is intensely connected to its environment, and as such its actions are conditioned and pulled by all the elements of the model. The guide goes further to explain the importance of technological scanning, foresight and cooperation in the creation and re-creation of innovation within a scientific and technological research field. Activities such as internal creativity, organizational capabilities and knowledge management are intensely related and key elements for knowledge dissemination. Finally, the COTEC guide demonstrates the third interface to be market research, sharing the knowledge of clients through internal and external analysis, which has been shown to be fundamental for the creation of innovative ideas. In the Chain Interaction

Model, the company interacts, learns and communicates with its core capabilities through the interfaces (COTEC, 2010).

Caraça et al. (2009) divide the ecosystem into macro and micro-environment, defining the macro-environment as the set of factors that have a direct impact on the probability of success of the innovation, and the micro-environment as the elements closer to the company that directly interact with the organization's innovation practices (cit. in COTEC, 2010).

Finally, Caraça et al. (2009) remind that in their model, innovation can start anywhere, and the outcome of the process can be product/process innovations, the creation of a new market segment or new ways of organizing the businesses routines (cit. in COTEC, 2010).

2.3.4 Innovation Activities Value Chain Model

Figure 2 - Innovation Activities Value Chain Model (adapted from COTEC & INESC, 2008)

The innovation activities value chain model proposed by COTEC & INESC (2008) is a tool utilized to map R&D activities and demonstrate how they create value. Based on Porter's value chain, the model is oriented towards the systemic and sustained implementation of innovation methods and processes in all areas of any company. It is divided into two major sets of activities, the support and the project activities. Within the support activities four management activities are considered: (1) global management of innovation activities, (2) intellectual property management, (3) knowledge management and (4) ideas and opportunities management. The project management activities should be adapted to each company but may consider some crucial elements as demonstrated in Figure 2.

Similar to the chain interaction model, COTEC & INESC (2008) propose that the outcomes may be innovation (product/service, process, organizational and marketing), inventions and/or simply the creation of new knowledge.

2.4 Factors Influencing a Company's Innovative Capabilities

Business models change radically from company to company and market to market. Chesbrough (2003) states that a business model always revolves around two key elements, creating value and capturing a portion of that value. In order to remain relevant in their market's companies must test other business models, i.e., new ways of value creation and capture, in order to carry out business model innovation (Grönlund et al., 2010).

In order to have sustained firm prosperity, Chesbrough & Bogers (2014) recall that it is indispensable to focus on appropriating value from the firm's unique capabilities. As such, it is believed by Grönlund et al. (2010) that companies should remain focused on developing a set of distinctive core capabilities. These capabilities should be thought and developed in order to allow specialization and synergistic economies, thus allowing the company to produce a continuous flow of innovation to the market based on its own resources. Gloet & Terziovski (2004) point out that the process of innovation is knowledge intensive, making it especially important to have the company's core capabilities in alignment with its innovation process models (cit. in Gordon et al., 2007).

The COTEC (2010) guide for innovation good practices has structured its view on the factors influencing a company's innovative capabilities by dividing them into four elements as shown next.

2.4.1 Circumstances

The internal circumstances of a company such as its strategy, culture and resources are going to impact its innovative behavior. The importance of the top management leadership is key to transmit an innovative vision, a vision that must be mentally and emotionally shared by all. Having an RDI policy that is aligned with the company's objectives eases the entire innovation process.

Another backbone of innovation is the organizational culture, which impacts the innovative performance of a company and its ability to take risks. As such, it is imperative to ensure a favorable environment by developing the pillars of an innovative attitude (adaptability, experimentation and learning), whose promotion is a top management responsibility. The organizational structure also must incorporate the RDI activities and consider that they might be temporary/occasional and/or permanent. Companies must be able to be flexible towards change in their structure in order to adapt to market needs. This management challenge, to allocate resources and responsibilities in a flexible manner, is a constant in innovation processes.

Finally, in the circumstances realm and aligned with the organizational structure point, it becomes imperative for the human resources strategies to be aligned with the RDI goals, developing practices that attract, retain and train employees.

2.4.2 Processes

As discussed in the sections above, innovation processes are quite complex and ever changing, making them a key factor for how companies innovate.

Communication is key in any company, but in the case of innovation processes its flow is crucial to bring sustained growth. As such, interfaces aiming at easing the communication between the different actors of the company's innovation ecosystem are of critical importance. They should all be aligned in order to communicate the same message to all actors. These interfaces should allow to identify, select and absorb ideas with innovative potential, in order to manage the company's knowledge by centralizing information. It is not only important to capture internal knowledge but to understand the market as well, its needs, preferences and values, by transferring knowledge between the company and its environment. The dissemination of knowledge acquired from the innovation processes is a crucial element in

order to achieve a continuous and sustained innovation culture. With proper care of its knowledge management, a company is also able to understand where and when external knowledge is needed and where internal knowledge is enough.

Creativity can be fostered but can also rapidly be destroyed. As such, it is important to implement some rules on how to manage innovative ideas, in order to avoid putting off employees and stopping the stream of new ideas. For this purpose, OECD (2010) has proposed the LEREIM methodology, that passes through the following steps: listen, reflect, evaluate, implement and measure. With any innovation process new elements might arise that require patenting or data protection, among others, in order to establish the company's competitive differentiation. The OECD (2010) suggests that processes are put into place in order to maximize the results of the innovation process.

Finally, all innovation projects should consider the measures suggested above at a company level as well as at a project level, and have a well-structured project encompassing the whole process, from planning to closure. The OECD (2010) emphasizes that for each company these criteria will change and evolve with time, and notes the importance of having in mind that processes and innovation goals should always be aligned.

2.4.3 Outputs

The investment in innovation efforts requires that the company organizes itself in order to take advantage and have a return on investment, justifying its efforts. The OECD (2010) suggests practices that allow the evaluation of the RDI activities in order to grow and improve over time, by applying corrective measures. Some of the suggested evaluation practices are innovation scoring, audits, reports and the implementation of KPIs.

2.4.4 Standardize & Certify

Due to the growing recognition and economic significance of RDI efforts there has been a need to harmonize and standardize terminologies, definitions, techniques and procedures. As such, norms have been established in order to standardize and better monitor the innovation efforts.

ISO:56002 - Innovation Management System Guidance

An organization can innovate in a more effective and efficient way if all its activities involved in the innovation process are managed as a unified system. A well-funded and implemented innovation system leads a company to better define its innovation policies, vision and objectives, in order to establish the processes necessary to achieve those objectives.

This norm is based on the principles of innovation management, that should be integrated and adapted to the company. Those principles are the foundation of any management system and are presented as creation of value, leaders focused on the future, strategic direction, culture, exploration perspectives, management of uncertainties, flexibility and a systemic approach.

NP:4457 - RDI Management System Requirements

The norm is based on the chain interaction model, since it is supported by its interfaces between the scientific, technological, organizational and market knowledge. It standardizes the requirements for a company to be able to certify its RDI management system. The goal for the company is to take the requirements proposed by the norm and customize them to the company's strategic innovation plan.

The norm is applicable to all innovation types described in the Oslo manual (product, process, marketing, organization). Oriented towards continuous improvement, the NP:4457 norm is based on the innovation management methodology of Kline & Rosenberg and the PDCA method of iterative plan, do, check, act cycle (OECD, 2010).

2.5 Service Innovation

As discussed above the investment in innovation can be beneficial to a company in many ways. Storey & Easingwood (1999) explain the benefits of the investment in service innovation as related to the possibility of improving the cost-effectiveness of the current offers, attracting new potential customers, and increasing customer loyalty, as well as opening the company to new potential markets. Services present specific challenges in their innovation process as explained by Fitzsimmons & Fitzsimmons (2014): (1) protection of intellectual property – it is extremely difficult to patent service processes since they are quite easy to copy and visible to competitors; (2) incremental growth – services tend to grow at an incremental rate since the system's actors usually participate actively in the services: (3) integration level – since there is a large involvement of the actors, systems must be implemented to integrate all actors (people, product and technology); and (4) service testing – to test services in a controlled environment can be virtually impossible, and as such they incur a risk of failure when launching.

2.5.1 New Service Development

In service innovation there is a close relationship among actors, so according to Fitzsimmons & Fitzsimmons (2014) new service development may come from several sources such as client suggestions, employee understanding of the system and its potential for improvement, exploration of datasets for potential service extensions, and demographic trends as well as technological advancements. All sources of information that enter the development stage in the new service development cycle (NSD) are presented in Figure 19, included in appendix B.

In the development stage the ideas are selected and go through concept development and testing processes in order to test their feasibility. The ideas then move to the analysis stage to determine their business potential, which is followed by the service design stage where the most time and funding are invested. The final stage is the full launch of the service.

The NSD cycle is supported by three enablers: (1) multidisciplinary teams that allow the company to have different specialized perspectives in the NSD process: (2) tools comprised by software that supports and structures concepts: and (3) organizational context, which is key to support innovation.

At the center of the cycle are its three pillars: (1) people, categorized as clients, who should be analyzed and understood, and employees, who should be trained to study and understand their clients: (2) systems, usually associated with the back-office, which have the purpose of enabling the service delivery: (3) technology advancements, which can be the foundation for radical or discontinuous innovation, and as such require companies to implement monitoring of technology advancements in order to protect their competitive advantage (Fitzsimmons & Fitzsimmons, 2014).

2.5.2 Service Design

Service design is an essential phase of the NSD process, in order to create a service that is developed with both the client and the company's expectations in mind. Mager (2009) explains it as being a way to ensure that the service interfaces being developed are useful and desirable for the customer while still being effective, efficient and distinctive to the service provider. While Ostrom et al. (2010) view service design as the synergy of clues, places, processes and interactions that will enable the creation of service experiences for all actors of the ecosystem. Brown (2008) describes service design as an iterative process with four stages: inspiration, ideation, reflection (through prototyping and testing) and implementation.

Patrício & Fisk (2013) show that in order to create new services multiple fields (marketing, interaction design, operations management, service engineering) must be integrated as multidisciplinary teams in order to orchestrate the service elements. Hefley & Murphy (2008) define service design as human centered since it entails understanding the different stakeholders and customers as well as their contexts. Meroni & Sangiorgi (2011) show that since service design is human centered it can enhance people's lives and better connect organizations with their stakeholders, all while co-creating value.

All in all, service design does not have a strict format, nor follow a particular set or rules Patrício & Fisk (2013) explain it as being the creative transition from understanding the experience of the customer to defining the service solution.

2.5.3 Multilevel Service Design

Multilevel service design (MSD) is a method that focuses on structuring the approach to service design, presented by Patrício & Fisk (2013) as an interdisciplinary method for the design of service systems. As service design, MSD is focused on customer experience and divided in three hierarchical levels: service concept, service system and service encounter.

By utilizing the MSD method, a company is presented with a much more holistic and integrated view of all levels of its services, allowing it to better understand how the service is delivered, while helping with the obstacle that is data and process illustration in services, and ensuring that companies can better identify the elements in need of improvement.

In Figure 3 Patrício & Fisk (2013) synthesize MSD as a four step process: (1) develop a deep study of customer experience, at all three levels (service concept, service system and service encounter): (2) based on step 1, the customer value constellation (CVC), which represents the relations between service offerings and the environment, is developed, allowing the design of the service concept: (3) design the service system architecture (SSA), which defines the structure of the service system by providing an integrated view of all interfaces and support processes of the service offerings, and the service system navigation (SSN), which maps alternative paths of customers through the different service encounters in the service experience: finally, (4) the service experience blueprint (SEB) is developed to better understand each service encounter.

The relationship between all the methodologies inserted in the MSD model are presented in Figure 4.
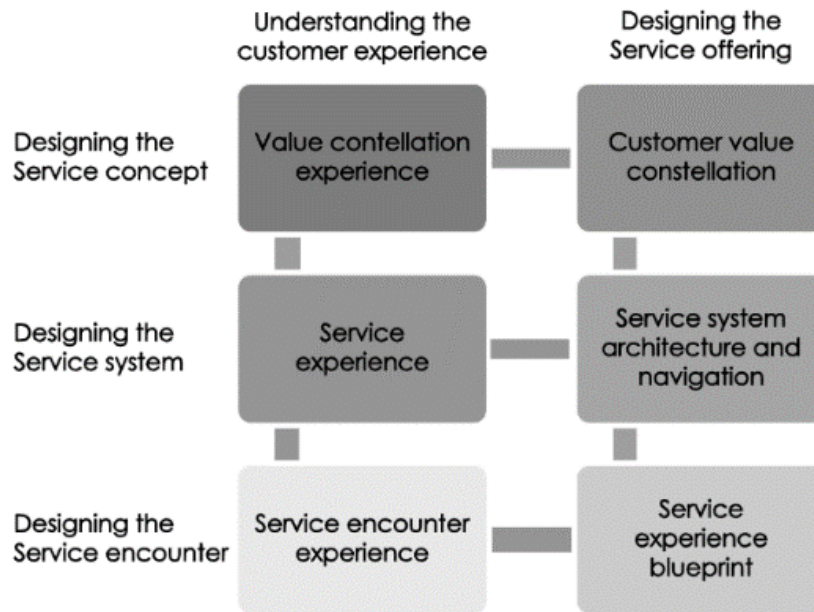
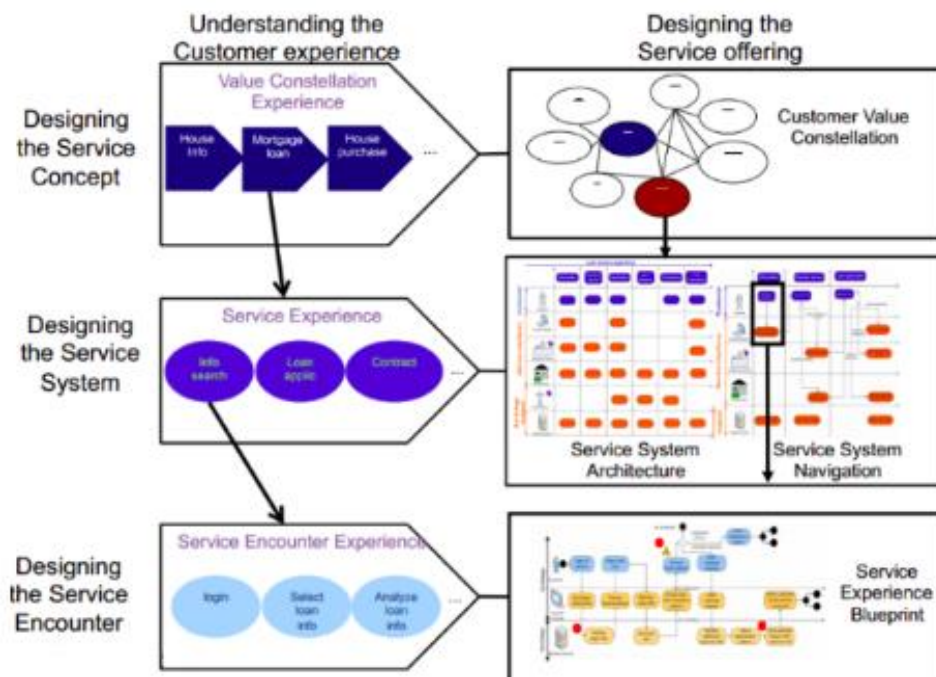**Figure 3 -** Multilevel Service Design Model (Patrício & Fisk, 2013)

Figure 4 - Model of the Components Present in MSD (Patrício et al., 2011)

3   Methodology

3.1   Possible Approaches

There are many possible approaches to any study, the most popular categories of methodologies being quantitative, qualitative and design science research (DSR) (Hevner et al., 2004). In this section an analysis and comparison of different approaches will be performed in order to better understand their characteristics.

The quantitative method is based on a deductive theory testing that takes a general statement/hypothesis and examines the data to reach a logical conclusion, going from general to specific. Sale et al. (2002) state that with the quantitative method all studied phenomena can be reduced to empirical indicators in order to represent the truth, explaining that there is only one truth on the quantitative paradigm, and that human perception is independent of objective reality. When using the qualitative method, the investigator and investigated must be independent entities. Guba & Lincoln (1994) highlight the importance of the investigator neither being influenced nor influencing the study. In the quantitative method techniques such as randomization, structured protocols and questionnaires are often used, with a restrained number of possible responses. It is also important to note that in this methodology sample sizes must be quite large in order to ensure the representativeness of data (cit. in Sale et al., 2002).

On the other hand, the qualitative method assumes that there are multiple truths based on one's construction of reality. Berger & Luckmann (1966) explain that reality is ever changing since it is socially constructed. Contrary to the quantitative paradigm, in the qualitative method the investigator and the object of study are interactively linked, and as such, findings may be created within the study, thus shaping the inquiry, making processes and meanings the focus of qualitative research. The techniques used in these studies can range from focus groups and interviews to observations. As such, Reid (1996) observes that the samples are much smaller and not meant to be representative of a population, but rather to provide smaller purposeful insights (cit. in Sale et al., 2002).

A combination of both approaches can be used in studies and is commonly known as the mixed method of research. Sale et al. (2002) explain that since they share the same goal of understanding the world, it can be useful to combine the methodologies in order to be able to study complex phenomena that might require different types of data analysis.

Finally, design science is fundamentally a problem-solving paradigm, looking to create innovations that could assist in defining ideas/products through its artifacts (may vary from software to informal natural language descriptions). Markus et al. (2002) explain that the creation of these new theories rely on the capabilities of the researcher, to apply, test, modify, extend on and problem solving. Over time DSR has been proven to be complex since researchers are trying to apply and design useful artifacts in new areas where theory is often scarce as explained by Markus et al. (2002). DSR is composed by two design processes (build and evaluate) and four design artifacts (constructs, models, methods and instantiations). During the research process the researcher must have a deep understanding of both the design processes and the design artifacts in order to be able to demonstrate feasibility and sustainability of the proposed artifacts (Hevner et al., 2004).

Also, of high relevance for this study, there are many problem-solving techniques, all with the goal of identifying and understanding possible causes of a problem, that prevent achieving some optimal performance. Dumas et al. (2018) refer to these as root cause analysis. even though the literature often illustrates the technique in business process analysis, it is not confined to that domain, and is commonly being used in other fields for incident analysis in order to understand

the root cause of the situation at hand. Causes may be divided into two types, causal factors and contributing factors. When causal factors are corrected, eliminated or avoided the issue will cease to occur. On the other hand, contributing factors can be explained when a system cannot perform a requested task because it was not designed to perform it (e.g. lack of a menu/interface) (Dumas et al., 2018).

Many techniques may be applied to perform a root cause analysis, each with its own methods and guidelines of how to develop interviews and organize information. The cause-effect diagram groups the factors into categories (and subcategories if necessary) in order to guide the search of the potential causes. When discussing with stakeholders, the categories are presented and discussed. The outcome of the discussion is a list of hypotheses that, after being validated (though observation of the system), represent the factors (Dumas et al., 2018).

3.2   Selected Methodology

The present section describes how the data were collected and analyzed and which techniques/methods were utilized along the research, while explaining how each was adapted to fit the context of the study at hand.

The methodology used is largely along the lines of design science research since this work goes beyond the understanding of the research problem into the development of solutions for that problem. The work starts out with a literature review in order to understand the scope of the context of the innovation field. Then, semi-structured interviews are performed with a sample of eight individuals (top management of the company). The interviews were informal, with open ended questions that varied from person to person. These were designed in such way as to capture as much information as possible about the current workings of the company, its processes and interactions with the RDI department, as well as the RDI department's internal processes.

The initial analysis of the interviews was done with NVivo, allowing nodes (collection of references about a specific theme) to be created, tiered and interlinked according to the relations between them. This phase started at the time of the first interview and had an impact on the structure of the following interviews as new nodes became more evident. After the interviews were completed, an in-depth analysis of the data was done (presented in appendix C). Alongside the interviews, observations of the RDI department's daily activities were performed and considered when analyzing the impact of certain elements. The combination of both the interviews and observations brought a holistic view of the interlinking between different aspects of the initial proposed problem. In order to have un unbiased analysis, only after understanding how the company "works" was a root cause analysis performed, by crossing the current state of the company with what the literature reviewed. In order to follow the DSR methodology artifacts were constantly validated. As such, the problems that arose from the root cause analysis were discussed with the head of the RDI department and adapted to the scope of the study.

As the DSR paradigm recommends, several models were adapted and combined in order to design proper artifacts to tackle the company's problems. These models were the chain interaction model, the innovation activities value chain model, as well as the multilevel service design model. As the solution was designed it passed through another phase of validation, with the top management. The artefacts were refined according to this informal discussion.

4   Case Study Description

The present chapter intends to describe the study context. It is based on semi-structured interviews to the top management of the company, as well as observation. It starts out by presenting the company structure and then the RDI department's current state, followed by a description of the company's innovation efforts. This chapter also seeks to bring together and structure information in order to better be able to analyze the necessary elements to answer *RQA*.

4.1   Research Context

E-goi is a Portuguese company based in Matosinhos, operating on a software as a service (SaaS) business model, that provides an omnichannel marketing automation platform that enables customers to manage their digital marketing needs. The platform merges several communication channels, such as E-mail, SMS, Smart SMS, Voice, Push and WebPush. Its key feature is its automation, allowing the setting up of smart marketing campaigns.

The company's vision is to connect brands with their final customers, through their platform, in the best possible way, creating optimized communication channels that will ensure a greater customer satisfaction and value creation. As such, its mission lays on the effective creation of communication solutions, that are intuitive for the user, allowing them to be implemented in any company, business model or location.

Having started in 2008, E-goi has seen a rapid growth in recent years, reaching around 100 employees in its headquarters. Currently it holds control of all its value chain, from research, to development as well as marketing activities. The company's formal structure is presented in Figure 5.
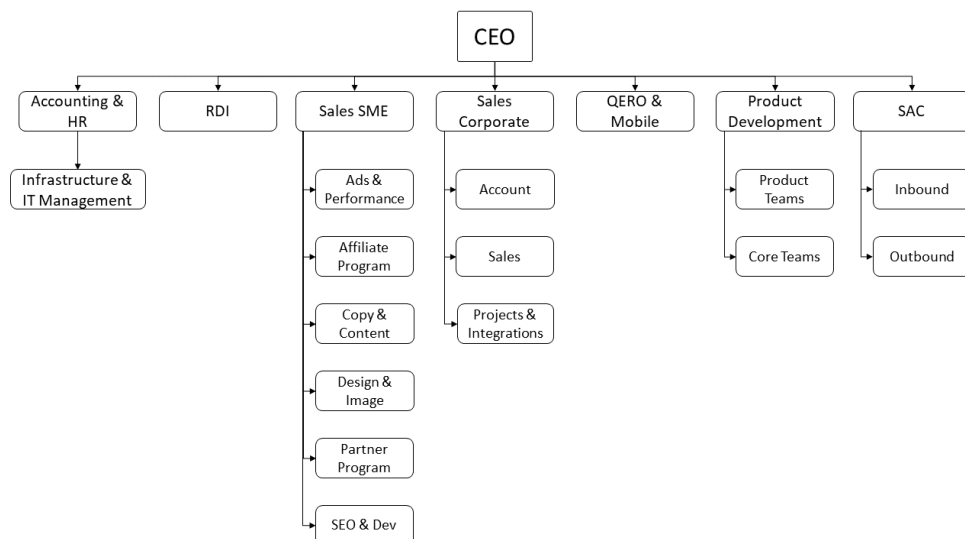
Figure 5 - Structure of the Company

Considering the competitive market E-goi is inserted in, great importance has been given to all R&D activities. In the beginning, the Product Development department ensured the development of innovative solutions to meet market needs. By 2017, a R&D department was created with the intent to ensure continuous and sustainable improvement to the company's products. In 2019 it evolved into the RDI (Research, Development and Innovation) unit. As the

department is in its primordial stages it is quite small, but its responsibilities are gradually growing, as E-goi's growth strategy has been relying more and more on this department's efforts.

4.2   RDI Department

In order to better understand the innovation processes of both the company and the RDI department, interviews were done with all heads of department (CEO, CTO, and managers of RDI, HR, SME sales, Corporate sales, SAC and Mobile). After the interviews and observation of the company's research development and innovation processes, a holistic view of the service and all its interfaces and points of contacts with the different departments and interfaces was developed and is presented in this section. A more in-depth and unrefined analysis of the respective data is shown in appendix C.

The RDI department has its mission centered in the innovation efforts of the company. With its focus on reinforcing the RDI strategy and positioning through the creation of new knowledge in new fields of technology, it aims at enabling the development of new features and technologies that will leverage E-goi's positioning in the field of digital marketing and marketing automation. The continuous and sustainable improvement of E-goi's portfolio relies not only on internal efforts, but also on E-goi's partnerships within the ecosystem, namely with companies and colleges that regularly participate in projects in co-promotion that offer mutual benefits for the participants.

The four core activities of the department are presented in Figure 6. They include the company's communication with the environment, which entails a set of activities crucial to promoting the company's innovative actions to both the market and the employees. The HR department is heavily present in this activity.

The RDI department also has at its core the need to manage the state and evolution of the innovation projects at hand. Each project of the department has the singularity of being quite different from the last and, as such, the department is in a constant adaptation of the project management process, utilizing different resources from different departments as necessary, since it is not a self-sustained department.

In addition, applications of innovation projects are performed in order to gather financing for the department and its projects, keeping it self-financed. This activity relies on the relationship with key actors both internally and externally.

Finally, the selection and management of internships is included in the core activities of the RDI department. This activity relies on all departments of E-goi, since all present proposals for projects. The partners, namely colleges, are also involved in this activity process.
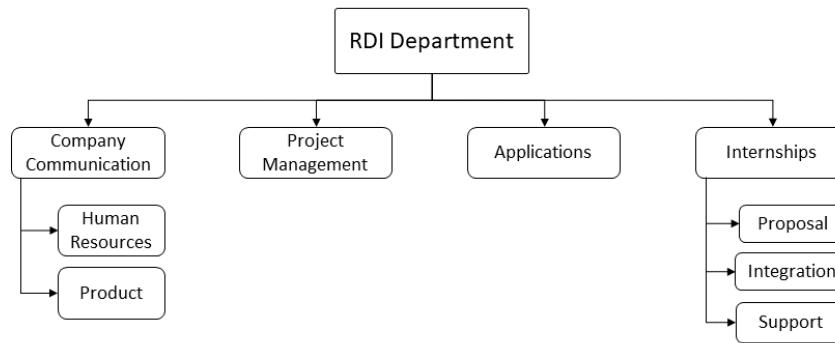
Figure 6 - RDI Department Structure

Company Communication

This activity belongs to the RDI department because it is related to sharing the company's accomplishments and innovative efforts with the ecosystem. It is divided into product and human resources. Even though articulated with the RDI department, the human resources strand is the responsibility of the HR department, focusing on delivering the communication of the company to the market and its employer branding. The head of the RDI department is also responsible (in articulation with the HR department) for some internal communications such as the monthly breakfast and the onboarding process.

On the other hand, the communication of the company's product is a process of the RDI department, focused on its dissemination in the academic market, through classes, seminars and/or lectures. The process starts with the study of the market and grooming of leads, followed by the scheduling of the activities. This area of activity has its own quarterly KPIs and metrics. Its manager leads all its activities and meets twice a week with the head of the RDI department to report and monitor progress.

The departments involved in the company's communication activities are mainly Human Resources as well as SME Sales for the product communication process.

Project Management

Within the department there are currently two main projects, each individually financed through its own application to public funding programs, and as such, each with its own binding regulations. The management of these projects currently falls under the responsibility of the head of the RDI department.

The types of projects that the RDI department focuses on are generally projects that involve a low TRL (technology readiness level) level, as well as projects that demand an exploration and deep research in AI (artificial intelligence) related subjects.

The departments that interact with the projects change according to the projects that are being developed, currently the Qero department and the systems team (Development department) are the main actors in the system.

Applications

In order to finance the RDI department several different types of applications are submitted every year by the head of the department, namely to SIFIDE, co-promotion, and RDI core programs.

SIFIDE is a fiscal tool that allows the creation of an optimal environment for the investment on innovation and development activities, allowing the recovery of the costs of innovation and development activities previously performed by the company, such as costs with personnel, patents, resources, among others.

The applications for SIFIDE are mainly done with projects from the previous year. The projects in co-promotion have a high priority since they have legal requirements to fulfill in order to acquire the grants.

The Accounting department is responsible for the financial aspect of all application processes.

Internships

The internships correspond to a major part of the department's responsibilities, ranging from the development of proposals and integration in teams to the support along the whole internship. These internships are mostly directed towards universities both at bachelor's and master's level.

The process begins with the identification of needs (or potential projects for development) from all heads of department. The information is later included in a document shared with the CEO and the head of the RDI department. The proposals are checked against the department's strategic goals for the quarter and year and then selected. From the selected proposals, a more formal and detailed document is developed with the head of the department (that made the proposal) and placed in the main channels (mainly universities). The head of RDI has previously established communication with the universities in order to place the internship proposals on their channels. Each faculty/university has its own particular process for the application and matching of students and companies, which are the responsibility of the head of RDI to manage. When the match is made, the head of RDI integrates the new employee in the respective department, with an introduction to a "godfather". The intern then enters the onboarding process. Afterwards, monthly support meetings are scheduled in order to understand how the internship is progressing.

All departments are involved in the needs identification phase, through individual meetings (with the head of RDI) at the beginning of the year. It is also important to note that some of the ideas for internships/theses/projects may arise at other times, and in these circumstances the head of RDI places these data in the shared document for future analysis.

4.3   Innovation Efforts

While analyzing the data from the interviews, three major dimensions emerged from as key elements of E-goi's innovation efforts. These portray the importance of the implicated actors and their impact in the innovation system. The dimensions are (1) innovation culture, (2) knowledge management and (3) the systems that support the processes. In this section, these three dimensions will be described (they may be further analyzed in appendix C which presents the interviews analysis in depth).

Culture

E-goi does not have a well-defined and formal innovation culture, but from the analysis of the information from the interviews and the observation of the company's activities it was clear that the company sees the importance of innovation and has several pillars that acknowledge that, such as the seeking of constant and sustained growth, the focus on growth from internal

resources, the presence of interdisciplinarity teams that share information across departments, and their value towards employee's innovation efforts.

Figure 7 demonstrates the elements present in E-goi's culture related to the IDI efforts that demonstrate how the company gears towards innovation. For more detailed information on this subject see appendix C under "culture".
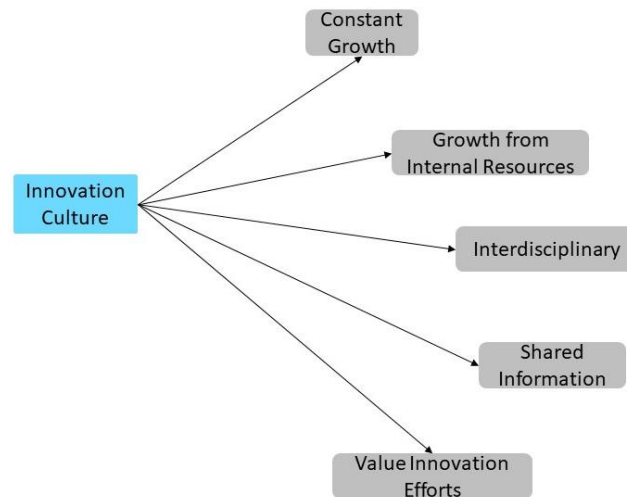

Figure 7 - Internal Innovation Culture

Knowledge Dissemination

Innovation does not branch only from within the RDI department, it is present all over the company in different ways. Activities that are designed to boost the company's innovation efforts, disseminate the innovation culture and knowledge across departments can be seen at all management levels of E-goi.

At company level there are activities such as onboarding, designed to introduce new employees to the company culture. There is also a monthly breakfast when projects are shared with all employees, making them part of the process. "What's new with E-goi" is a weekly activity in which all employees are introduced to product changes. The Goickathon is a yearly challenge dedicated to utilizing internal knowledge in order to develop innovative products/services. Finally, the company's internal system (bitrix) is used to deliver general communications.

At department level, activities vary according to their needs. The development department has the product day, designed to "educate" the company's sales team on the new developments of E-goi's product. The Sucathon is a yearly event dedicated to the development team, for exploring new projects. The corporate sales department has a monthly sharing event within the team in order to share knowledge on how to handle situations and clients. The HR department is responsible for all necessary training efforts across the company, making an annual amount available to each employee for personal continuous improvement.

At top management level, the knowledge dissemination activities are more related to high level decisions, such as yearly and quarterly planning and gathering the needs of each department.

On an environmental level there are many connections and relationships being made since the company understand the importance of relating to its surroundings. The RDI department is

responsible for connecting to colleges and educational centers through classes, lectures and projects. The development department develops courses and webinars in order to better portray E-goi's products.

From the interviews Figure 8 was constructed in order to demonstrate the knowledge dissemination activities at the different levels of management, as well as the departments that are related to those activities. For more detailed information on how these activities impact the company's innovation efforts see appendix C under "knowledge dissemination".
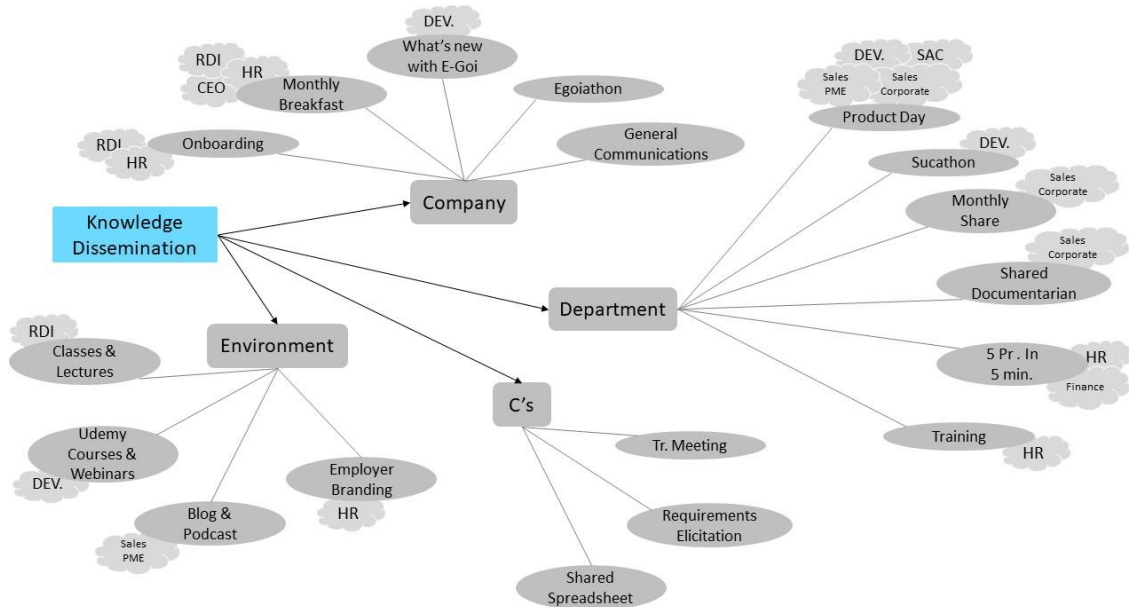

Figure 8 - Knowledge Dissemination Activities

Systems

Many systems are used throughout the company to store/share needs and ideas, bitrix, is the internal system, that supports a wide array of possible actions. There are two main sections of the system that are dedicated to the sharing of new ideas. In the suggestions section, employees can make small/incremental suggestions to improve the internal processes or activities of the company, with HR responsible for providing feedback and managing the implementation of the ideas. On the other hand, the ideas menu of bitrix is dedicated to large disruptive ideas, that might change how things are done within a department, the company or even the market, with the CEO responsible for providing feedback and managing the development process.

Figure 9 illustrates the different systems utilized in the company to retain and disseminate knowledge as well as the innovative ideas that circulate though the company. The departments and actors that are responsible for the systems are also represented in the figure. More detailed information on the systems used at E-goi can be seen in appendix C under "systems".
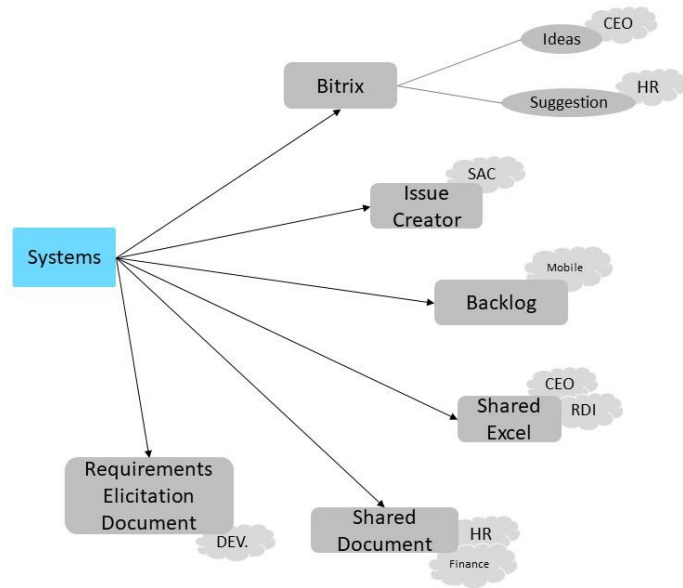
Figure 9 - Utilized Internal Systems

5   Problem Identification and Characterization

As the study focuses on the exploration of a company's innovation model, its inherent interdependencies, surrounding ecosystem and its willingness to adapt to the ever-changing business reality, the present chapter is dedicated to identifying the problems that may turn into potential improvement opportunities in that domain. To reach the conclusions presented the knowledge retrieved from the literature review and the case study description were merged, compared and then analyzed by utilizing the root-cause analysis qualitative technique. This methodology was adapted in order to better fit the study at hand, since it is not process oriented. By crossing the literature with the current state of the company a glimpse into the potential of *RQ1* begins to arise.

The chapter is divided into sections that address two main areas, the problems at company level and at department level. Nevertheless, as was discussed in chapter 4, innovation efforts are often linked with several other internal or external processes/activities. As such, problems identified in one facet may also be linked to or/and have repercussions in another, and their causes be similar.

5.1   Problems at Company Level

Innovation is not solely centralized in the RDI department, as was shown in chapter 4, it is scattered across the entire company, making it more challenging to control or monetize if necessary. Each department presents its own processes for innovating in its field, but they are mostly focused on innovating from necessity. There is an understanding at the management level of the importance of innovation and the existence of an RDI department, but on the other hand, there is not a clear understanding of what that entails and what is the scope of innovation management at E-goi.

The literature has looked at the importance of managing innovation. According to Maier et al. (2012), without it innovation will not stop occurring, but its full potential will not be exploited and it will continue to occur in an almost accidental fashion.

To study and understand innovation management at E-goi is a complex matter, and as the department is fairly small, with only three employees, it is not possible to have a dedicated element performing tasks such as gathering all innovation inputs across the company as well as its surrounding ecosystem without a comprehensive and dedicated model constructed to perform such activities.

At a broader level, the lack of understanding of the scope of innovation efforts is visible across several departments, and makes it clear that there is a profound need to define and structure what are E-goi's innovation goals, and what it will/should be focusing on in the next quarter/year/years. As reviewed in section 2.4, having an RDI policy integrated with the company's objectives and shared across all the departments could have a big impact in the entire innovation process and employee behavior towards it.

New knowledge acquisition is imperative to the innovation process, as described in section 4.3 and appendix C. E-goi has many knowledge dissemination and acquisition activities, but once again, these are spread out and unstructured. The literature notes that it is key to have an open innovation model in order to maintain the company constantly innovative and not "burn up" all internal innovation efforts (Chesbrough & Bogers, 2014). Currently some departments have a way of dissipating knowledge between themselves, even at the company level as well, but, these

activities do not consider the importance of centralizing all gathered knowledge for future and easy knowledge acquisition. Activities such as relationships with partners or knowledge of potential markets are not systematically shared, and as such, knowledge is sometimes lost and not used to its full potential.

An overview of E-goi's identified innovation-related problems and their inherent causes, at the company level, are systematized on Table 1.

P1	Lack of a clear structure to the innovation activities, actors and their relationships	
	C1.1	Innovation is spread out across multiple departments of the company
	C1.2	Lack of dedicated people to do the information gathering
	C1.3	Lack of clear understanding of the scope of the innovation activities
	C1.4	Lack of clear framework
P2	Lack of a clear innovation policy	
	C2.1	Fast growth
P3	Lack of a structured process to capture and share knowledge both internally and with the environment	
	C3.1	Organic, non-documented
	C3.2	Each department has different ways of sharing knowledge
	C3.3	Co-workers do not have a way of sharing knowledge gathered from the environment systematically

Table 1 - Improvement Opportunities at Company Level

5.2 Problems at Department Level

The RDI department is quite recent, comprising some important activities for the company's innovation efforts, but lacking in strategic long-term planning. This long-term view is complex to develop since there is no current clear vision of the objectives of the department and how they might align with the company's business and strategic plan. Since it does not have a clear understanding of its objectives, the department also does not measure its performance, making it hard to understand the potential capability to take on a project at any time. As section 2.2 shows, innovation is very complex to structure and measure, nonetheless it is extremely important to design methods to do so. The OECD (2010) considers the ability to measure innovation a way of maximizing and constantly improving upon the innovation process, contributing to establish a company's competitive differentiation.

As a new idea for a potential new project arises, the process to uncover it is quite disorganized. Ideas may occur from anyone, at any time. On a quarterly basis, some retrieval of needs and ideas is performed by the managers, but this information is kept on both personal and restricted sharing spreadsheets, that follow no significant criteria or filter. Ideas can be left untouched for long periods of time, as well and unknown to key decision-making actors since there is no clear route for a potential innovative idea or project, as shown in appendix C.

When innovative ideas are not retrieved on the quarterly process they can sometimes be "lost" as there is a lack of awareness to the current idea capturing system, called bitrix ideas. As

employees are not familiar with this system, they usually share their ideas informally (and do not record them) leaving them to potentially be forgotten. Currently there is no process for idea capturing, evaluation, or feedback. The importance of a clear structure to capture and process ideas is presented and described by the OECD (2010), that suggests for this purpose the LREIM methodology, which passes through the following steps in order to maximize the results of any innovative process: listen, reflect, evaluate, implement and measure.

All throughout the company, the problem of lack of project documentation is also present. But for the RDI department this is an even greater hurdle, since it is imperative to have documentation to perform its key activity of project application for funding.

Within the department, projects do not follow a standardized process, making it difficult to measure the performance of the department and its projects. Each project is at root different from the previous ones, making standardization quite complicated. As there are no dedicated project managers, they are initially forecasted and guided by the department head.

An overview of the RDI department's problems and inherent causes is provided in Table 2.

P4		Lack of a clear understanding of the objectives of the department
	C4.1	Lack of strategic planning of the RDI activities
	C4.2	Lack of a clear understanding of the department's capabilities
	C4.3	Lack of connection with the business plan
	C4.4	Lack of a clear activity's roadmap
P5		Disperse and unorganized information
	C5.1	Multiple spreadsheets both personal and shared
	C5.2	Lack of dedicated time or people for analysis of data
	C5.3	Lack of centralized platform
P6		Lack of projects documentation
	C6.1	Lack of standardization of innovative projects documentation
P7		Innovative ideas being lost in the "noise"
	C7.1	Lack of knowledge of available systems
	C7.2	Lack of idea capturing & evaluation processes
	C7.3	Lack of idea feedback
	C7.4	Ideas shared informally are not processed/registered
	C7.5	Lack of centralization of innovative ideas
P8		Lack of a project management processes
	C8.1	Small department
	C8.2	Lack of dedicated project manager
	C8.3	The diversity of types of projects

Table 2 - Improvement Opportunities at Department Level

6 Proposal and Development of Solutions

After identifying E-goi's improvement opportunities and understanding their root causes this chapter exhibits presents the actions proposed in order to solve or improve upon the company and department's problems, addressing the research questions presented in chapter 1 (*RQ1, RQA, RQB*), i.e., understanding how service design can be adapted to improve upon the company's innovation efforts, as well as which elements bring more value in order to prioritize the efforts of development.

In this chapter different models were combined in order to better adapt to the case study at hand. The chain interaction model and the innovation activities value chain model as well as the multilevel service design model, were adapted and combined in order to offer a better solution for the problems identified in the case study. These methodologies allowed the identification of service critical points and failure points as well as improvement needs.

The chapter is divided according to three levels of detail, a more organizational high-level view where all the innovation activities of the company are characterized, standardized and properly related with each other. On the second level all activities presented in the first level are described and when necessary improvement solutions presented.

Finally, on the third level, three key activities from the first level are deconstructed in detail and clear actions are introduced. The reason for the selection of the activities presented on the third level is their importance within innovation efforts, both in the literature and according to the company's needs. As such, they are key activities that without proper action will not allow an innovation management system to sustain itself. The third level went through an informal discussion and validation with the top management level of E-goi in order to achieve a more accurate and useful solution proposal. All the schemas and analyses presented on this level are the final versions, adapted to the needs and capabilities of the company. The adaptations from the informal discussions are presented in each third level analysis.

Table 3 relates the problems presented in chapter 5 with the actions presented in this chapter.

	Problem	Action	Action Description
Company Level	P1	A1	Development of an RDI Activities Model
	P2	A6	Development of an Innovation Policy and Strategic Planning of the RDI Activities
	P3	A1	Development of an RDI Activities Model
		A2	Creation of a Centralized System for Knowledge Dissemination and Storage
Department Level	P4	A4	Creating a Structured Spreadsheet to Manage RDI Department's Resources
		A6	Development of an Innovation Policy and Strategic Planning of the RDI Activities
	P5	A7	Development of an MSD of an Ideas Management System
	P6	A7	Development of an MSD of an Ideas Management System

	P7	A5	Manual Retrieval and Update of Ideas into to the Ideas Management Service
		A7	Development of an MSD of an Ideas Management System
	P8	A3	Mapping of the Department's Project Processes

Table 3 - Problem and Respective Action

6.1 RDI Activities Model

A1 – Development of an RDI Activities Model

Considering the literature, Kelly & Kranzburg (1978) demonstrate the importance of innovation management by explaining that it allows an organization to rapidly react to opportunities both internal and external. It is for both problems 1 and 3, which relate to the lack of a clear structure for the innovation activities, knowledge capturing and disseminating processes, that this action 1 (A1) was devised.

Action 1 is the structuring of the RDI elements by developing a high level RDI activities model. As the literature shows, it is imperative to structure, measure and deeply understand all the innovation efforts. By mapping out the company's innovation activities with value creation in mind one can better understand how the company may structure itself in order to be sustainable in its innovation efforts.

The model presented in Figure 10 follows the innovation activities value chain model, adapted to fit the needs of the company. As it has been made clear in the case study description and the problem statement, E-goi currently has many innovative activities at play. Managing their complexity requires understanding the scope of the system, structuring all its elements and understanding their relations.
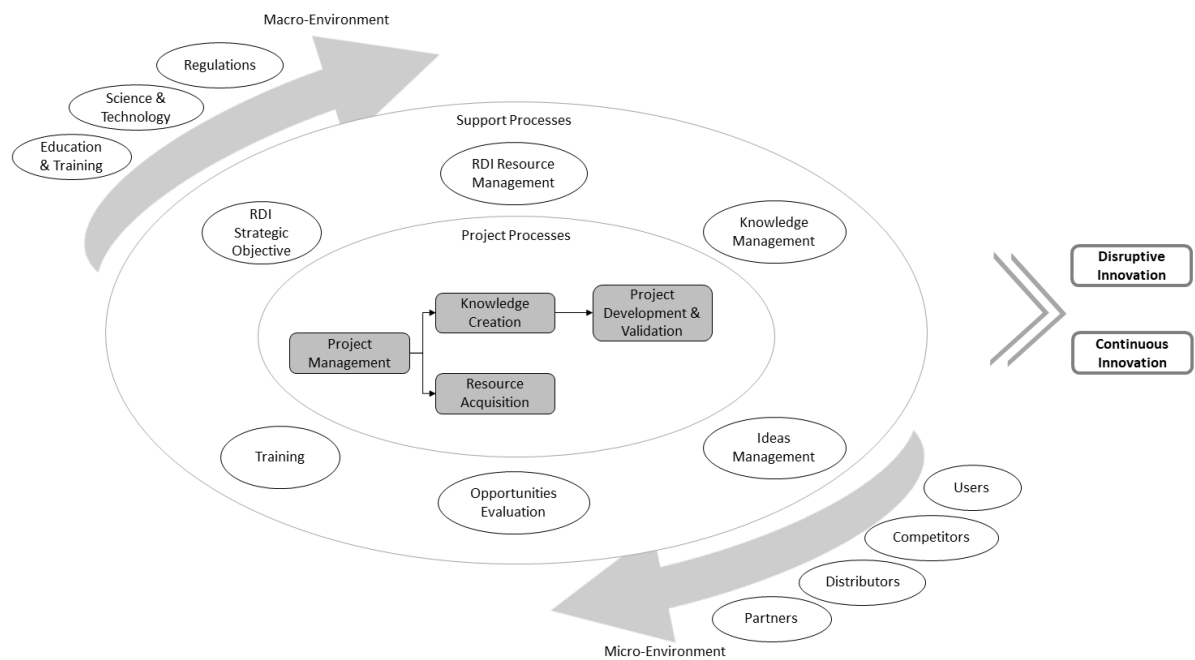

Figure 10 - RDI Activities Model

The RDI activities model corresponds to the level 1 analysis, offering a high-level view of the innovation activities. It is comprised by the support processes and, at its core, the innovation project management processes. It is crucial to understand the importance of the micro and macro environments and their impacts on the management system. The main goal of the RDI activities model is to lead to both continuous and disruptive innovation. In the remainder of this chapter the elements that comprise the RDI activities model will be further explained and deconstructed, in order to better understand their importance and potential need for restructuring.

6.1.1   Macro-Environment

A2 - Creation of a Centralized System for Knowledge Dissemination and Storage

The Macro environment of the RDI activities model must consider its surroundings, and as such, the company should constantly be aware of, and keep up with, its evolution. Education and training bring new knowledge into the company maintaining the sustainability of the innovation efforts. Science and technology are in constant evolution, affecting the environment and, if properly captured, boosting innovation. The sector's regulations are key to keep up with, since their ever-changing state might lead to new and innovative opportunities.

Regular knowledge retrieval and analysis activities must be put in place in a standardized fashion as referred to in action 2.

6.1.2   Micro-Environment

A2 - Creation of a Centralized System for Knowledge Dissemination and Storage

The Micro-Environment includes the actors closest to the company and with more impact on it as well, making them extremely important actors to pay attention to. The company's partners are essential actors that share knowledge (both ways), help finance projects and communicate innovative projects to the market. Keeping this close relationship is of great importance to the company. Distributors such as agencies also help promote and distribute the company's products.

Keeping up with the company's competitors and their innovative endeavors is also important, since their advancements may affect the company and subsequently its revenue. Finally, understanding users, their needs, wants and how they interact with the company and its surroundings is imperative to the company's innovation efforts. Currently the company performs several of these tasks but needs to standardize how this essential knowledge is managed. Action 2 intends to help with these aspects.

6.1.3   Project Processes

A3 – Mapping of the Department's Project Processes

Within the RDI activities model, project management processes are shown at its center, being presented as one of its core activities. From the interviews and observation phase (chapter 4) it was clear that this core activity was only being performed mildly, since there was no dedicated project manager to perform it and no other available resources. The type of projects the department focuses on are largely at early stages involving a low TRL, requiring some exploration and deep research.

Projects may come to fruition through many routes, but when a project is set to be performed by the RDI department it must go through its own dedicated process in order to better achieve its objectives. As such, having a clear structure for the main activities of the RDI department's projects is crucial to be able to manage, evaluate and properly adapt according to what is needed.

Figure 11 is based on the innovation activities value chain model, adapted to the specific activities of the company's department. Action 3 addresses problem 8 and the lack of a project management process. As this was considered for a level 3 analysis, both the schema and its activities were discussed with company management, and the information presented is an adapted version more aligned with the department's needs and reality.
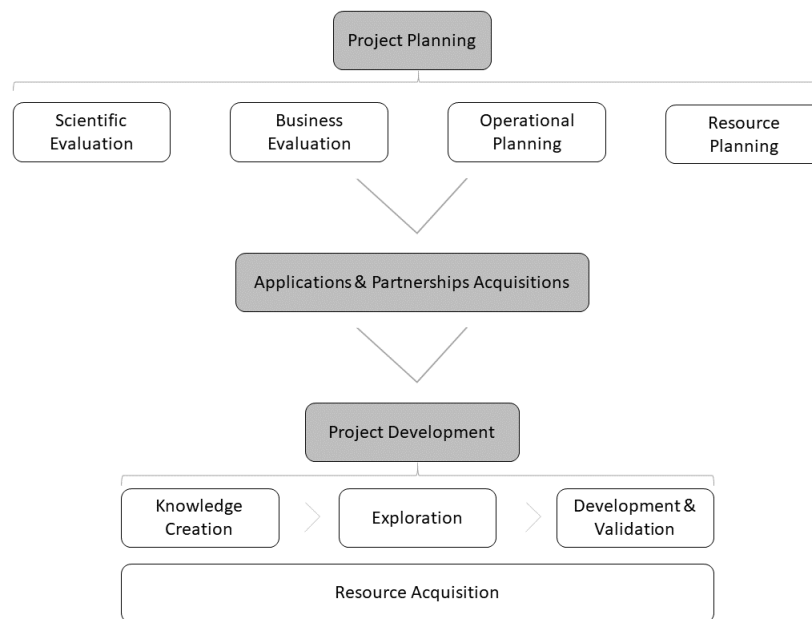

Figure 11 - RDI Project Management Processes

Figure 11 is a proposal of the project management processes for the RDI department. Divided into three main steps, it starts out with the project planning. As explained in section 4.2, the projects that are undertaken by the department are mostly at an early stage, and as such, a deep understanding of the validity of the project must be developed. Feasibility studies are the first step of the process, then the team must build an operational plan for the project as well as understand the resources required to develop it (human, intellectual, financial and physical).

After developing a deep understanding of the project's scope, a key activity for the department that must take place is the creation of the necessary partnerships and applications to fund the project at hand. It was noted during the informal discussion with the top management of E-goi that the applications and partnerships phase may not always be present on the second phase of the project management process. But it may be done at any stage, either in the beginning to gather funds or acquire partnerships, in the middle to bring some necessary assistance into the project, or even in the end of the project to post-finance it. In order to be able to perform this activity, the previous one (project planning) must be properly documented.

The third main step is to develop the project at hand, starting with the creation/acquisition of new knowledge. This stage will take time and often seem like it is not producing any outcomes, a challenge RDI departments often face, though it is important to note that only through it can

the exploration of proposed solutions be done with confidence. Finally, the team sets out to develop the project and periodically validate its progress. Alongside these three activities, resources are being acquired as needed, either training for the team or other type of resources required to develop the project.

6.1.4   Support Processes

- **Training**

In order to build a sustainable RDI activities model, training must be constant and in the most diverse subjects. Successful innovative efforts need constant new knowledge, and as such, the organizational structure of the company must be aligned with the innovation strategy. By providing an annual amount dedicated for training to each employee, HR seeks to provide the tools required for each individual to improve on a regular basis.

The training element of the RDI activities model interfaces all departments and is not restricted to a single format, adapting according to the needs of the company, department and employee. This activity is the responsibility of the HR department, but holds deep importance in the innovation activities model, thus being referred to in this segment.

- **Knowledge Management**

The innovation process is knowledge intensive, as mentioned in chapter 2, emphasizing the importance of having the core capabilities of a company aligned with its knowledge creation and dissemination processes. The management of knowledge in E-goi's case was divided in three levels: internal, macro-environment and micro-environment. By understanding the importance of knowledge and having analyzed the current knowledge dissemination activities some actions remain necessary:

- Internal

The internal knowledge of what the company is doing and working on at any given time, is quite clear and well designed. The current activities are demonstrated in appendix C under "knowledge dissemination".

- Macro-Environment

A2 – Creation of a Centralized System for Knowledge Dissemination and Storage

It is crucial to keep up to date with scientific and technological evolution, as well as regulations, and converting this information into valuable knowledge. Across all departments activities with this objective occur, so that the action that must take place is the creation of a centralized system where information is stored and disseminated to all employees.

- Micro-Environment

A2 - Creation of a Centralized System for Knowledge Dissemination and Storage

Alike the macro-environment, the knowledge management of the micro-environment is crucial to maintain the department updated on the state, needs and wants of partners, distributors, competitors and users. This information must be structured and easily disseminated through the different departments.

Action 2 aims at creating solutions for problem 3 by centralizing both the technological and market knowledge of E-goi's surrounding environment.

- **RDI Resource Management**

    A4 – Creating a Structured Spreadsheet to Manage RDI Department's Resources

As with every department, resource management is necessary in order to be able to achieve the proposed goals and think long term.

As such, the understanding of the department and company's resources will allow a better evaluation of potential strategic innovation opportunities, and their inherent risk. To be able to do so, the department must be keenly aware of the company's abilities, by keeping track of its own procedures, results and global activities, taking as foundation the department's strategic planning and its goals that are subsequently accomplished by projects/activities. These activities must be monitored in order to be able to understand the department's ability to seize a new opportunity at any time.

A well-structured spreadsheet must be devised at the start of every quarter to track both OKRs (objectives and key results) for the main goals as well as KPIs for the projects and activities of the department. By better understanding the internal department capabilities, A4 combined with A6 will be able to assist in problem 4.

- **Opportunities Evaluation**

    A5 – Manual Retrieval and Update of Ideas into to the Ideas Management Service

For ideas that come from outside the "regular" ideas management service (A7) another process must be taken into consideration, in order not to "lose" any potentially interesting innovative ideas. As such, ideas that are related to internship projects or might be mentioned outside of the idea section of the bitrix system must be retrieved manually and inserted into the system. They then should follow all the steps in the ideas management service described above. Giving feedback, value and importance to all ideas has been shown to be an effective means of maintaining a sustained stream of new innovative ideas (OECD, 2010).

- **RDI Strategic Objectives**

    A6 – Development of an Innovation Policy and Strategic Planning of the RDI Activities

Chapter 2 introduced the importance of a company's innovative behavior and how its strategy, culture and resources will influence, and impact that behavior. A company's RDI strategic objectives as well as its innovation culture must be aligned with the global business strategy of the organization. Having a long-term vision when defining these objectives is crucial, considering aspects such as the future state of the company, its vision for a sustained growth, the surrounding markets and its competitors, the ever-changing policies, and economic and legal stability. The definition of the strategic objectives and the innovation policy help establish the boundaries of all innovation processes, showing where the priorities should lie, and making them important instruments for the decision-making process.

In order to broaden the scope and strengthen the success potential of the innovation strategy, an innovation culture must be instilled in the company. These activities should support and sustain the innovation efforts, which may come from activities or people, by spreading the innovation culture across the entire company.

The guide for innovation good practices refers the importance of developing and communicating these objectives with the leadership and the involvement of top management (OECD, 2010). As such, after the interviews the information was organized and presented to

the managers, and a discussion phase took place with the company management being provided the opportunity to examine a proposal for E-goi's innovation policy. The schema presented in Figure 12 represents the improved version that resulted from this informal discussion and is considered a level 3 analysis of the RDI activities model.

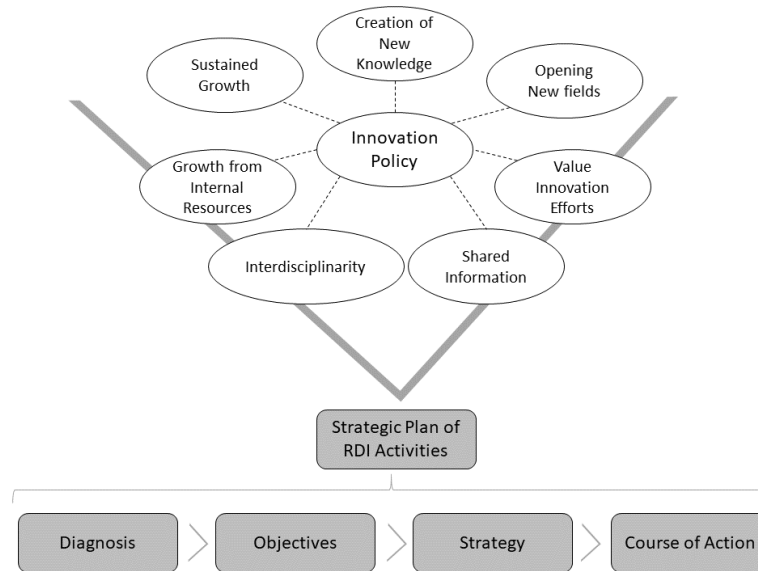Action 6 has the purpose of addressing problems 2 and 4.

Figure 12 – Innovation Policy and Strategic Planning

Figure 12 illustrates how the innovation policy allows for a more aligned strategic planning of the departments activities. E-goi's innovation policy was developed based upon an informal discussion with the top management in which the data described in section 4.3 were debated, reorganized and combined with the company's long-term goals, thus developing the innovation policy. It is oriented to opening new fields as well as creating new knowledge. Having its focus on sustained growth, the company values all innovation efforts from its employees, by creating paths that allow the sharing of information across all teams and departments, empowering its personnel to take an active part in the innovation process. A well-defined and communicated innovation policy helps to better guide the department and prioritize its activities.

Yearly, the RDI department's strategic objectives should be defined and then subdivided into quarterly objectives and goals, based on the innovation policy and E-goi's objectives for that year/quarter. These strategic objectives should be evaluated and readjusted periodically as it is done in other product teams through the company. The strategic planning should start out with a diagnosis of what are going to be the department's strategic goals for the year, a process that must involve both department head and CEO. Then the goals must be organized into objectives with corresponding KPIs, a strategy devised to reach the defined goals, which finally should be refined into the course of action. With this planning effort, the results of the department can be evaluated and continuously adjusted accordingly.

6.1.4.1 Ideas Management

<p style="text-align:center">A7 – Development of an MSD of an Ideas Management System</p>

There are many ideas flowing through the department as well as the company. Developing a structured service is imperative in order to better capture and evaluate these innovative ideas while transforming them into opportunities. As discussed in chapter 4, E-goi has an organic creative culture instilled in its employees, but if not properly fostered it can rapidly be deteriorated. According to the literature cited in chapter 2, creating rules to manage ideas will ensure a more sustained and optimized stream of innovative inputs.

In order to combat disorganized information, the lack of project documentation and the lack of idea capturing and processing activities (P5, P6, P7) a new service was created using the MSD methodology, following its four steps of service design: (1) customer value constellation, (2) service system architecture, (3) service system navigation and finally (4) service experience blueprint.

An initial draft version of the multilevel service design was presented to the top management and discussed, considering the idea management topic a level 3 analysis. Improvements upon the initial version were made in order to better align it with E-goi's core capabilities, business objectives and the relevance of the problems at hand.

Value Constellation
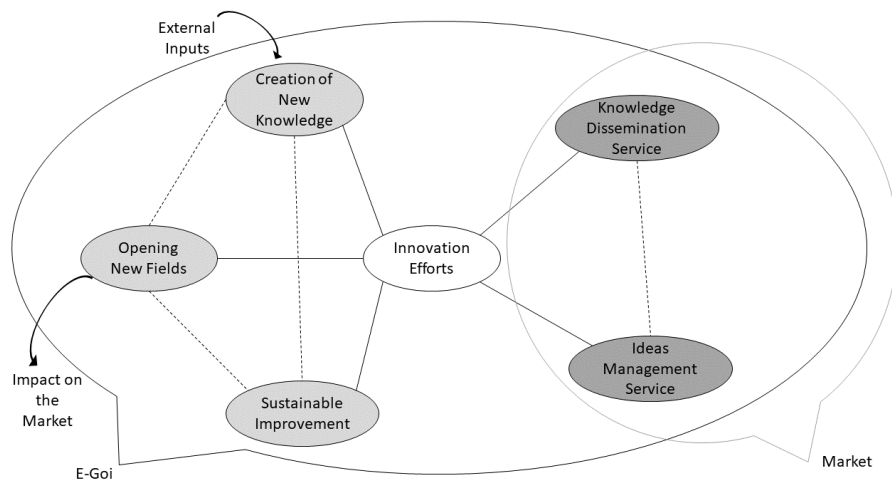

<p style="text-align:center">Figure 13 - Value constellation of Innovation Efforts</p>

The value constellation presented in Figure 13 depicts the service concept of the company's innovation efforts, as well as the relationship between the service offerings, the objectives and the actors. The relationships shown in the value constellation enable its actors to co-create value within the ecosystem.

At its center is the core value of the service, the innovation efforts of E-goi, which in turn are surrounded by three main objectives of the company and subsequently its RDI department: the creation of new knowledge, opening new fields and assuring E-goi's sustainable improvement/growth in the market. Two services are portrayed relating to knowledge dissemination and capturing, which are in constant communication as one "feeds" the other.

All the services and objectives, within the value constellation, are performed/offered internally by the company, some of wich are impacted and influenced by the market (eg. through technology evolution and/or market growth) and its competitors, as demonstrated in Figure 13.

E-goi's innovation efforts serve the goal of a sustained improvement of current services as well as its sustained growth within the market. As such, the creation of new knowledge must take place in order to open up new fields, both in new services and in new markets. These objectives require both internal knowledge and external inputs, in order to impact the market with the opening of new fields to E-goi.

In this topic we will be focusing on the Ideas Management Service and how its related systems should be designed/adapted in order to achieve the company's innovation goals continuously.

Ideas must all be concentrated in one place, the bitrix ideas system, where employees can introduce their ideas to the company. This system currently exists but must be more communicated in order to be better used. In order to continuously "feed" the idea menu of bitrix, the innovation culture must be well disseminated, promoting the generation and sharing of new ideas on a regular basis. For this purpose, events such as the goickathon are a good incentive, and it is important to ensure that the process returns positive outcomes and does not have failure or breaking points.

Service System Architecture

The process that follows the "introduction" of a new innovative idea to the system must be designed and structured. The service system architecture presented in Figure 14 frames the innovation management service and deconstructs it into seven phases: (1) post idea, (2) peer evaluation, (3) RDI screening, (4) board evaluation, (5) idea grooming, (6) board final evaluation and (7) decision communication.
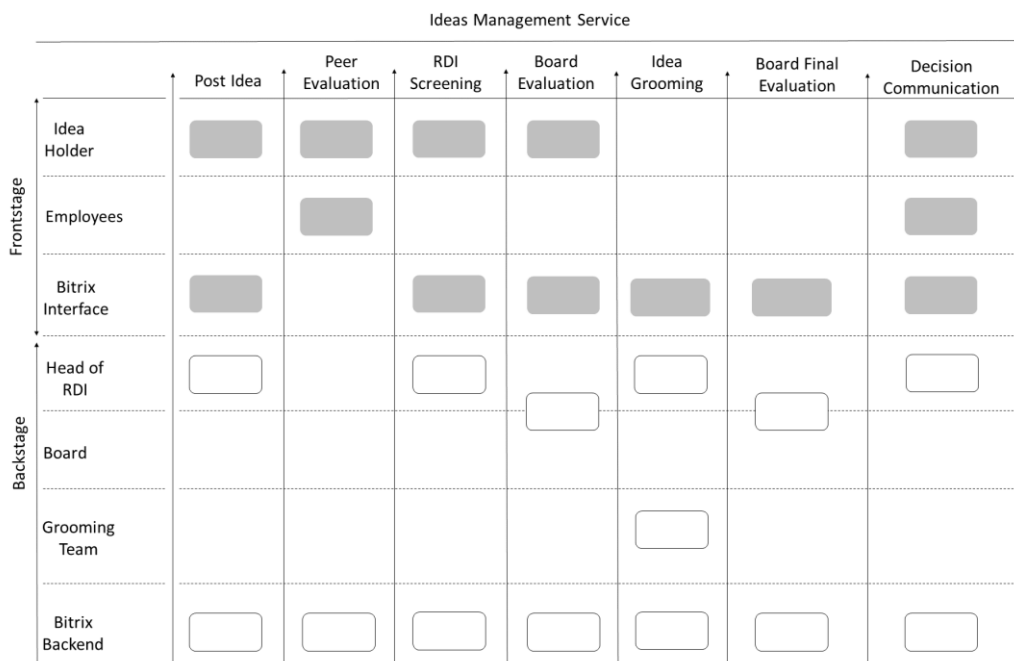

Figure 14 - Service System Architecture of the Ideas Management Service

On the left side of the figure, the actors are represented and divided into front and backstage. On the frontstage are the idea holder, the company's employees and the systems interface (bitrix

ideas). On the backstage are the RDI head, the board, which is composed by top management, the grooming team, composed by an element from each team from all departments, and the backend of bitrix. The marks shown in the figure denote where the activities encounter the actors both in the front and backstage.

Upon presenting the initial version of the MSD to the top management, many aspects were brought to light, namely how would the featured service interact with the company's current processes and day to day activities. Some of the more relevant aspects discussed were related to the actors present in the system. The board needed to be composed of all top management in order to have a realistic view of what could be a "good" opportunity. Another actor that arose from the discussion was the grooming team, required since the RDI department is quite small and would not be able to handle the load. The timings of each activity were also discussed at length, as since this service will "take" time from other current activities outside of the RDI system, they must be perfectly aligned. As such, each activity that has "outside" actors (board and grooming team) starts either at the beginning or end of a quarter, thus being aligned with the current functioning of those teams. The activities that the ideas management service might create are then introduced into the team's quarterly goals, therefore not creating extra challenges for the teams and avoiding losing priority over current activities.

When an employee has an innovative and potentially disruptive idea, it is placed in the bitrix ideas system. The idea should include value proposition and strategic context as well as answer two questions: (1) what does it impact and (2) what does it improve? The RDI head is included in the post idea phase, being notified of the new post in order to be able to monitor its evolution.

After the idea is submitted to the system, it goes through a peer review process. This process is important to keep all employees (no matter the department) engaged with the company's growth, which is part of E-goi's values. The idea holder is involved in this phase since the peer evaluation process may raise questions and spark debate.

Every two weeks the RDI head will screen all new ideas, and if any prove to be of interest, they are selected for the next stage. In the beginning of every quarter the board and the RDI head will evaluate all pre-selected ideas, with the idea holder always being notified of any change to the idea post. The selected ideas will move forward to the idea grooming phase, where a pre-selected element from the grooming team will perform an in-depth business and technological feasibility analysis. All the data retrieved in any stage of the process is attached to the initial idea post in order to better track and centralize all potential project information. The final board evaluation occurs at the end of every quarter and takes into account the information added by the idea grooming phase and reevaluates the feasibility of selection of the idea/project for implementation. The selection phase also defines when and what team will be taking on the task of developing the proposed idea if it is to advance.

Finally, the decision must be made public, engaging all the actors involved in idea management. Feedback and accountability towards good ideas has been proven throughout this case study to be extremely effective in keeping the cycle "alive" and promoting the sharing of new and improved ideas.

When implementing this new service it is key to keep in mind that there are already some ideas stored in shared documents throughout the company (shown in appendix C) these ideas will also have to be introduced into the system and categorized in order to "break some bad habits" and centralize all innovative ideas into one database.
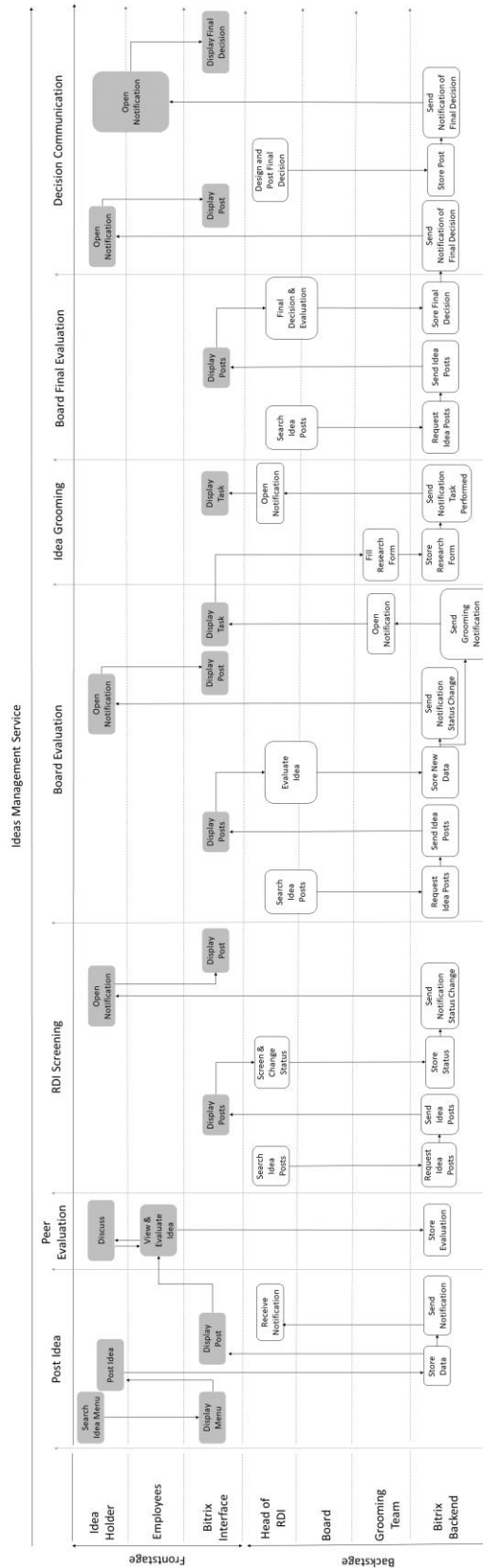
Service System Navigation

Figure 15 - Service System Navigation of the Ideas Management Service

After the SSA, the service system navigation maps out in a more detailed way the alternative paths of customers in their different service encounters. It is important to note that Figure 15 has the same activities and actors as the SSA.

The trigger that initiates the SSN is the idea holders having the need to share their ideas. They start out by searching for the idea menu, once the menu is displayed, and posting an idea that is stored in the backend and immediately displayed on the interface. With every post made on the idea system a notification is sent to the head of the RDI department to alert of a new idea submission. All employees can immediately see and evaluate the new idea post, these evaluations are again stored, and the post is updated on the system. Within the peer evaluation phase employees may also question the idea holder on some elements of the idea, thus opening a two-way discussion between these two actors (idea holder and employee).

Every two weeks, a filtering process is initiated by the head of RDI, starting with a search of all new posts from that timeframe, an evaluation of feasibility is performed, and a new status is assigned to the post. The idea holder is updated of the new status. This activity is regularly performed until the next stage is entered. In the beginning of each quarter the board and the head of RDI select all the pre-filtered viable ideas/projects and perform an evaluation. A new status is added to the post, and once again the idea holder is notified of the new status update. If the idea is to be selected to move forward, the team in charge of performing the next phase is notified of its task.

The idea grooming phase has the duration of a quarter. The reasoning behind this extended period is that the individual that will be performing this task might not be able to prioritize it above current quarterly goals. This phase will cross other internal department processes, thus with the previous phase (board evaluation) being performed in the beginning of each quarter, the grooming task may be seamlessly introduced in the quarterly objectives. During this phase, the selected groomer will have to perform a business and technological feasibility analysis by filling the necessary elements within the task (form shown in appendix D). When the task is finished the head of RDI will receive a notification in order to be aware of its closure. If the task is not performed by the end of the quarter it is the head's responsibility to understand the reasons and take action as necessary.

By the end of each quarter all groomed ideas are once again filtered and evaluated by the board and the head of RDI in the board final evaluation phase. The whole information is revisited, and a new final status is given to the idea/project. If the idea proves to be of value to the company and is to be moved forward into implementation, it enters a new process outside of this present service. This new process should retain the information already retrieved within this service system.

Finally, in the decision communication phase the idea holder is notified of the final decision, the head of RDI prepares a post with the final decision of the board and a notification is sent to all employees. At every step of the service all information must be annexed to the same initial idea post. The information to be added is shown in the form presented in appendix D.

Not all ideas will complete the service system navigation since not all will be selected to move on to the next stage. A more detailed understanding of these cases is shown in the service blueprints presented in Figure 16 and Figure 17.
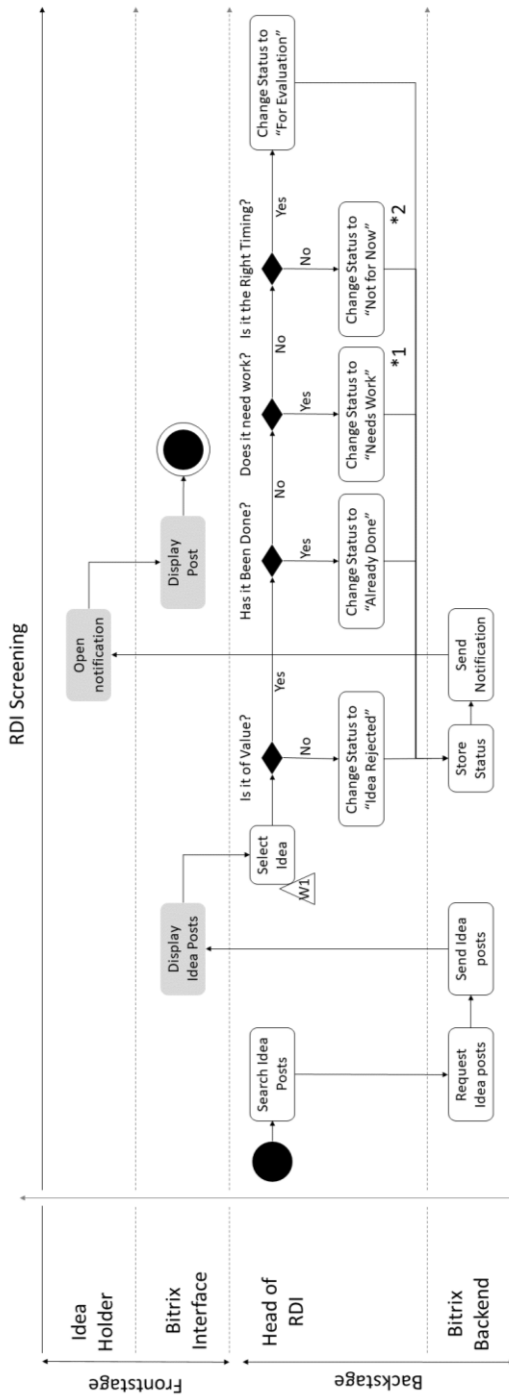
Service Blueprint
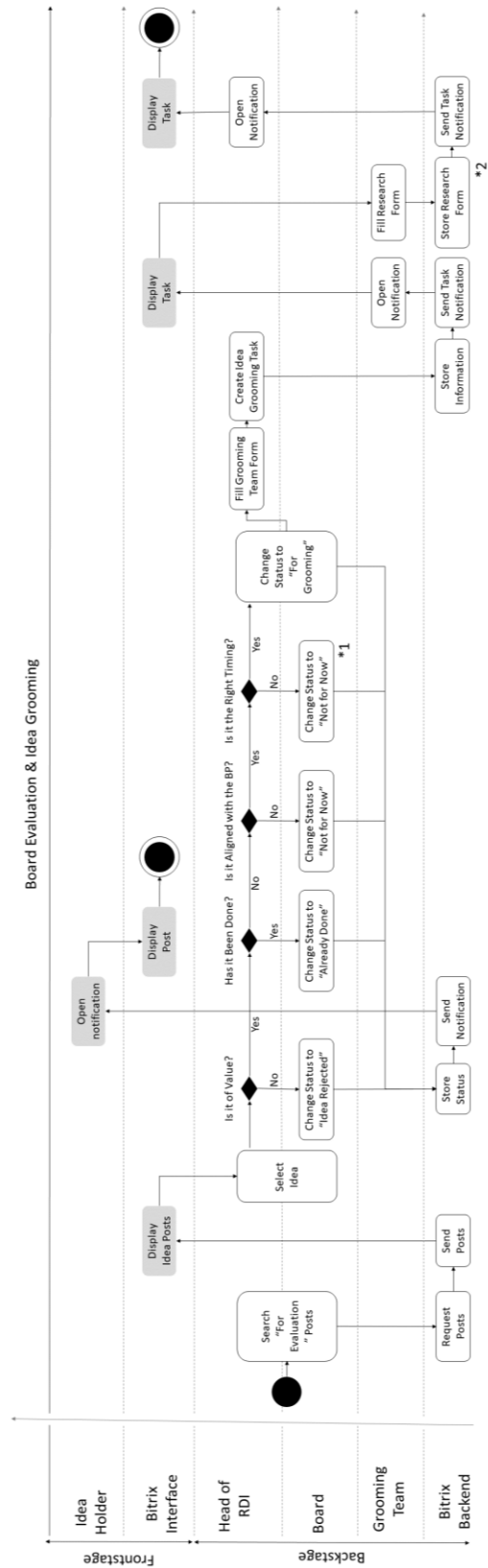
Figure 16 - Service Blueprint for RDI Screening

Figure 17 - Service Blueprint for Board Evaluation and Idea Grooming

To better understand the RDI screening service encounters, a service blueprint was developed as shown in Figure 16. Since the system for placing ideas in part already exists it was considered relevant to create the necessary procedures in order to avoid that system's current waiting and failure points. For this schema the front and backstage were reduced to only the necessary actors present in the service encounters.

The experience starts out with the beginning of a new idea evaluation cycle. The head of the RDI department searches for the idea posts from the past two weeks. A request is made to the backend and sent to the system interface. After selecting an idea the head of RDI starts the evaluation by "asking" it a set of questions in order to assign each idea its appropriate status. This is considered a waiting point (w1) since it requires some time and it may face a lack of availability from the department head. Ideas can be assigned 5 different statuses: (1) for evaluation, when the idea is ready to move on to the next stage of research; (2) needs work, when the idea needs to be reworked by the idea holder; (3) not for now, when the idea is of value to the company, but for some reason it is not able to developed at the moment (e.g., lack of resources); (4) already done, when the idea has been developed before; and (5) idea rejected, when the idea is not of value to the company.

When an idea is assigned its status, a comment explaining the nature and reasoning of it is also attached to the idea. Then the backend stores the new information and sends a notification to the idea holder. If the idea "needs work" (*1) the idea holder is free to do the necessary alterations and repost the new idea. If this is the case, the new reworked idea will restart the process in the next evaluation cycle. On the other hand, when the idea is considered "not for now", it is stored with this status and regularly the head of RDI will reevaluate all ideas with this status. When the idea is considered of value and "for evaluation" it will move on to the next phase, the board evaluation. The data are stored until the board gathers to evaluate the ideas for evaluation. The next steps of the service encounters are demonstrated in figure 16.

Figure 17 presents the service encounters of both the board evaluation and the idea grooming phases of the idea management service. In the beginning of every quarter the head of RDI and the board (all top management and the CEO) convene to evaluate all the new ideas of the past quarter. Starting out by filtering all the ideas with the "for evaluation" status from the past quarter, the board and the head of RDI then go through a similar question procedure as in Figure 16. The first two questions are more general and are meant to rapidly identify unfeasible ideas/projects. The third step questions is concerned with whether the idea is aligned with the business plan. It is important to note that since the business plan is an ever evolving element of a company, the idea can be of use later in time and thus could be considered "not for now". If the answer to the last question (is the timing right) proves to be positive, the idea gains a new status "for grooming". When ideas are considered "not for now" (*1) their status is stored and the head of RDI is responsible for regularly retrieving and re-evaluating them.

When an idea is considered "for grooming", it moves on to the next stage, the idea grooming stage. When establishing that the idea is set to be groomed the board selects who, from within the grooming team, will perform the ensuing idea grooming process. When selected, this will automatically be inserted into the quarterly objectives of the team.

The head of RDI then fills out a form with the information about who will be responsible to perform the idea grooming, and creates the task, attaching it to the initial idea post in order to keep information centralized and projects in their early stages properly documented. This task has mandatory and standardized elements that should be performed in order to conclude it (see

appendix D). The backend will send the employee selected for grooming a notification with the task to be performed. The task is to be performed until the end of the quarter. When the task is performed the head of RDI will be notified of its closure. If the task is not performed within the necessary time (*2) the head of RDI is responsible to enquire and assist as necessary in order to ensure its success, closing this service encounter.

6.2   Discussion

From the activities presented in this chapter it is clear to understand that not all are readily available for implementation. The third level, comprised by three elements (project management, strategic objectives and the ideas management service), were the activities selected to be addressed in more detail. These were discussed with key actors and adapted to the company's needs while considering the models and concepts presented in chapter 2.

After developing the RDI activities model, an analysis was carried out to identify what were the activities that without them being well defined the model could not operate. With the help of the literature and a deep understanding of the company's capabilities, the three elements were selected, addressing *RQA*. Project management presented itself as core, since even if every other element of the model was perfectly devised, as long as there was not a clear and structured project management processes the system would not be able to produce real and exploitable innovation.

Secondly, the strategic objectives were considered, and through the same thought process understood as imperative to properly describe. Without a clear goal/objective, a clear path cannot be created. And, understanding (through interviews) there was no innovation policy to drive this goal to fruition, an innovation policy had to be devised. As the literature has discussed, involving top management is crucial to align business and innovation objectives. This proved to be of great importance to be discussed with the top management, since there were many different understandings of what innovation should be for E-goi.

Having understood the vision for the RDI department and the company's innovation efforts, the activities that involved the capture and analysis of innovative ideas (management) proved to be the fuel that fed the system and kept it self-sustainable. As such, it was invaluable to understand and structure what actions, actors and systems were to be involved in this element. The methodology that proved to better apply was MSD, in order to design a new service that would map out all necessary interactions, thus addressing *RQ1* and *RQB*.

In this way chapter 6 was able to map out and understand all elements that comprised the company's innovation efforts, while providing clear solutions for each element in order to eventually implement them.

7 Conclusions and Future Research Directions

The objective of this study was to understand the current situation and identify improvement opportunities in order to propose improved solutions to the innovation efforts and RDI department of the company. The focus was on the activities that would have an impact and ensure a long-term sustainability of the innovation efforts of E-goi.

This closing chapter is devoted to presenting the pivotal conclusions that were drawn from the research process in order to meet the research objectives described in chapter 1. The second section of the chapter portrays the future research directions.

7.1 Conclusions

The first phase of the study proved to be essential in order to properly guide the second. Only by understanding what innovation in all its aspects and intricacy is, was it possible to carry out properly oriented and insightful interviews. From the interviews an extensive knowledge was gathered about the ins and outs of the company, how it currently functions and actors interact. It was clear to understand that E-goi is undergoing a rapid business growth and is in a constant state of change and adaptation to its ever-changing environment. Although the company needs to be very flexible, it was also noted that some structure to its innovation efforts proved to be indispensable. As such, this was chosen as the focus of the next stages of the study.

By performing a deep analysis of the interviews, observations, root-cause analysis and crossing information with the literature review several improvement opportunities arose. Only by understanding the causes and how they affect the elements can realistic solutions be constructed. The problems were sectioned into company and department level, even though they mostly derived from the lack of centralization of information and the lack of a clear multi-dimensional structure.

Upon understanding the potential improvement opportunities, the study moved on to devise and prioritize proposed solutions to solve/mitigate the problems encountered. An RDI activities model was created and its elements described. With a second round of discussions, the priority elements of the system were debated in order to understand what should be the scope and focus of the solutions. The elements selected were the ones that proved to be of higher value, that would sustain the management system and that were of greater importance to be primarily implemented, thereby addressing *RQA*. These were Project Processes, Innovation Policy/Strategic Planning, and Ideas Management.

The proposed solutions will allow the company to understand the scope of their innovation efforts. With the creation of an RDI activities model, E-goi is able to visualize all activities and actors that are present in the system and eventually measure their innovation efforts. In order to facilitate the implementation all elements of the model were described and explained along the study, with particular focus on the three key elements. The project process intends to bring structure and clarity to an existing process, and a very simplified model was devised in order to give clarity to the department in their internal project organization. On the other hand, the innovation policy brings an indispensable understanding to what are the guidelines for the RDI department and the company in general.

Finally, a more in-depth exploration of the ideas management element was performed. Following an MSD methodology, a service was devised to improve the current solution. Its objective is to mitigate the complex and virtually inexistent process of idea revival analysis and

development, thus addressing *RQ1* and *RQB*. With this new service E-goi is able to centralize and continuously and seamlessly elaborate new innovations in all types (product, process, marketing and organizational).

7.2   Future Research Directions

Due to the short time span, few dedicated internal resources and small dimension of this study, the implementation phase was not initiated within it, and as such it is not yet possible to provide data on the success of the proposed solutions. In this sense there is much work to be done within the area of this work. From this project, others may elaborate and progress, thus improving the many elements of the RDI activities model.

The creation of metrics to evaluate the success of the implementation of the studied elements would be an interesting step, by focusing on understanding the new results achieved and adjust if necessary. Secondly, a study and analysis of the surrounding activities should be performed in order to understand if they are affected.

The design of mockups and development of the new "bitrix ideas" interface should be included in the next steps in order to fully implement the new service in the company. When considering this proposal, the study of user experience and user interfaces must be delved into, as well as a deep understanding of the different actors that will interact with the system.

One of the most crucial factors of a well-established RDI activities model is the shared innovation culture. For this, all elements of the top management must be aligned and spread this culture top-bottom. For future work it is important to understand what are the key elements that must be present in order to be successful in this endeavor.

Finally, and most importantly, all elements of the RDI activities model must undergo an in-depth analysis in order to detail their necessary improvements for a seamless implementation.

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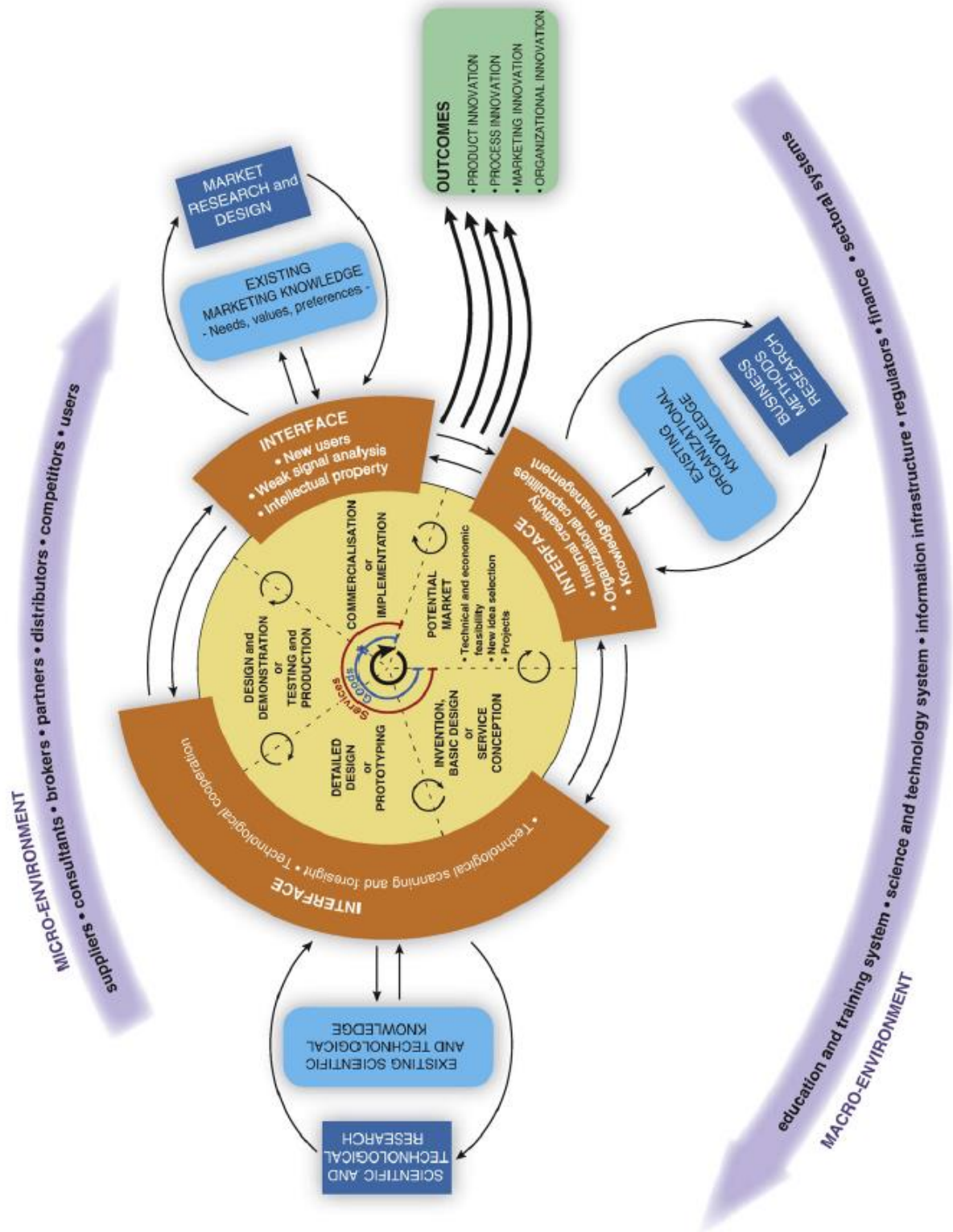## APPENDIX A: Chain Interaction Model

Figure 18 - Chain Interaction Model (COTEC, 2010).

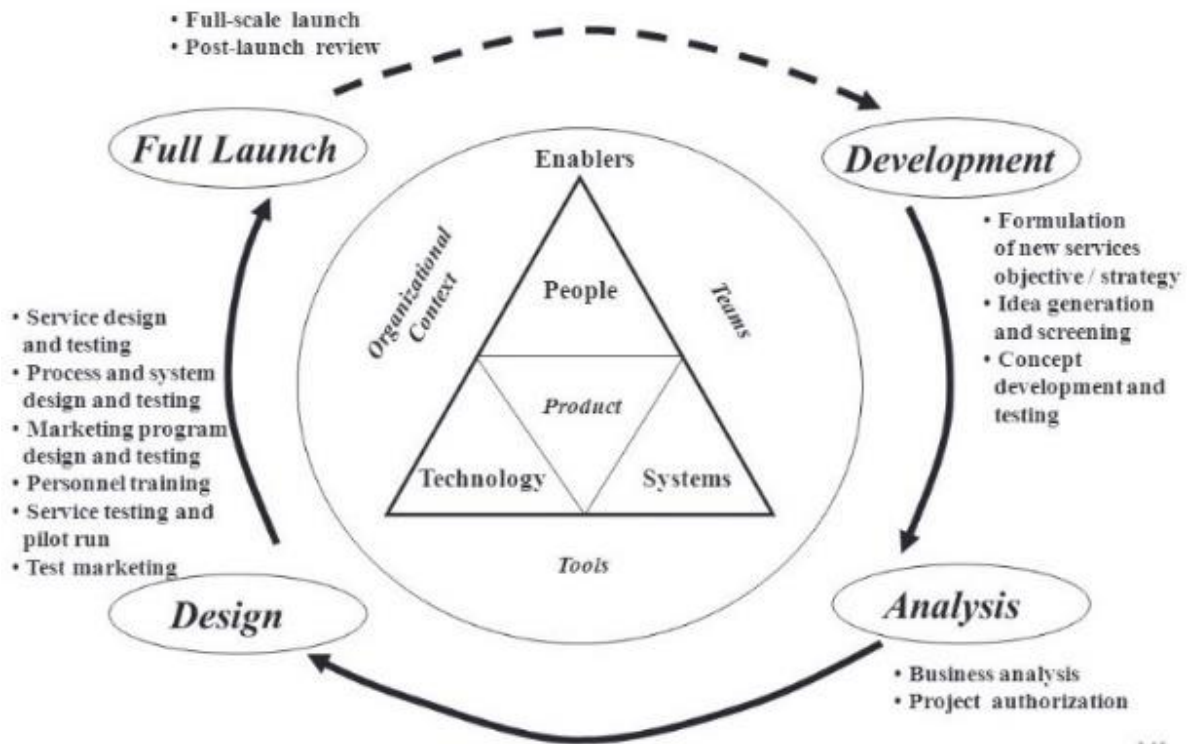## APPENDIX B: New Service Development Cycle

Figure 19 – New Service Development Cycle
(adapted from Fitzsimmons & Fitzsimmons, 2014)

APPENDIX C: Results from Informal Interviews

As previously explained informal interviews were performed to the top management of the company. The dada was analyzed with NVivo and as a vast number of nodes arose the information was structured in a visual manner as shown in this section. In order to better understand and decompose the large amount of elements that comprise the stydy, mind maps were developed. Bazeley and Jackson (2013) show the importance of visualization and how it provides an ability to comprehend large amounts of data, facilitating the understanding of both large and small-scale features of the data.

Activities

The RDI department is formed by 4 major activities/responsibilities, the applications to projects, internships, project management and the company's communication to the environment. Even though these activities are of the responsibility of the RDI department, most of them have a reaction and depend on other departments in order to function. The Figure 20 represents these departments as clouds, while the activities are represented by the boxes.
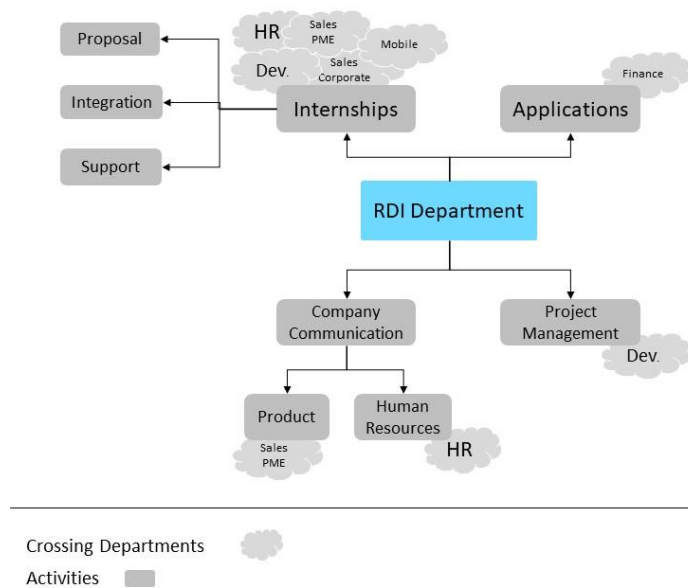

Figure 20 - RDI Activities

- Applications

In order to finance the RDI department several different types of applications are submitted every year by the head of the department, namely to SIFIDE, projects in co-production, and for the "*núcleos*".

The applications for SIFIDE are mainly done with past projects from internships (since these are properly documented). The projects in co-production have a high priority since they have legal requirements to fulfill in order to acquire the grants.

The department of Finances are responsible for the financial aspect of all application processes.

- Internships

The internships encompass a big part of the departments responsibilities, it goes from the development of proposals, integration on teams to the support along the entirety of the internship. These internships are mostly directed towards universities both at the degree or master's level.

The process begins with the retrieval of necessities (or potential projects for development) from all heads of department, the intel is later spilled into a shared doc (with the CEO and the head of the RDI department). The proposals are checked against the departments strategic goals for the trimester/year and then selected. From the selected proposals more formal and detailed are developed with the head of the department (that made the proposal) and posted into the main channels (mainly universities). The head of the RDI previously has made the bridge of communication with the universities in order to post the internship proposals on its channels. Each faculty/university has its own particular process for the application and matching of students & company, these are of the responsibility of the head of the RDI to manage. When the match is made the head of RDI integrates the new employe in its department presenting him/her to its company´s "godfather". The intern then enters the onboarding process. Afterwards, monthly support meetings are scheduled in order to understand how the internship is going.

All departments are involved in the necessities retrieval phase, though individual meetings (with the head of RDI) at the beginning of the year. It is also important to note that some of the ideas for internships/thesis/projects may arise at other times, in these circumstances the head of RDI places these data in its shared doc for future analysis.

- Project Management

Within the department there are currently 2 main projects, and as previously explained, each project is individually financed through the applications process, as such, each has its own binding regulations. The management of these projects currently fall under the responsibility of the head of the RDI department.

The type of project that the RDI department focuses on are generally projects that involve a low TRL (technology readiness level) level, as well as projects that demand an exploration and deep research in AI (artificial intelligence) related subjects.

The departments that interact with the projects change according to which projects are being developed, currently the Mobile department and the systems team (Development department) are the main actors in the system.

- Company Communication

The final main activity of the RDI department is the communication of the company to the market. This is subsequently divided into product and human resources. Even though articulated with the RDI department the human resources strand is of the responsibility of the human resources department, focusing on developing the communication of the company to the market and its employer branding. The head of the RDI department is also responsible (articulated with the HR department) for some internal communications such as the monthly breakfast and the onboarding.

On the other hand, the communication of the company's product is a process of the RDI's department, focused on the propagation of the company's product in the academic market,

through the lecture of classes, seminars and/or lectures. The process starts out with the study of the market and grooming of leads, then the activities are scheduled. The project has its own KPIs and metrics for the trimester. The head of the project manages all its activities while the head of the RDI department meets twice a week with the head of the project to monitor its progress.

In the company's communication activities, the departments involved are mainly the Human Resources as well as the Sales PME for the product communication process.

Knowledge Dissemination

Another subject studied in the interviews was how the knowledge is disseminated within the company, this was divided into 4 categories as shown in Figure 21. Within each category are shown the activities of knowledge dissemination related to it, similar to the previous point the clouds represent the departments that interact or are responsible for these activities.
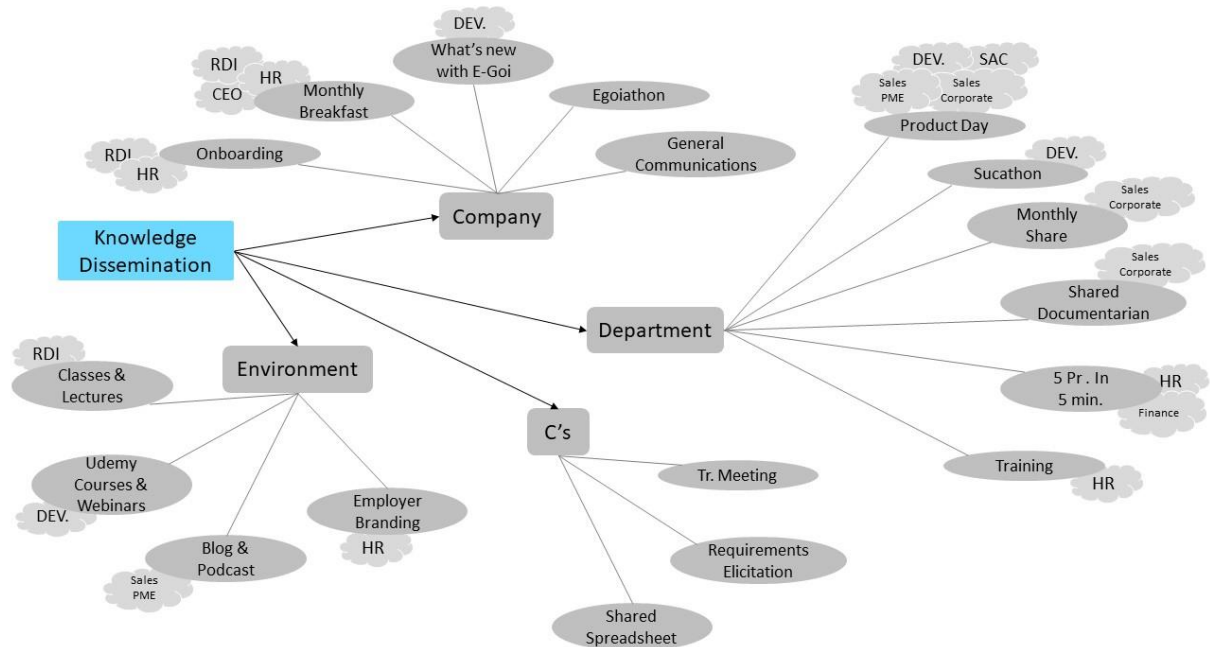

Figure 21 - Knowledge Dissemination

- Company

At the company level there are several activities with the intent to reach all employees and keep everyone up to date in all important matters, the company has seen rapid growth so management sees these activities as keys to success and as a way to avoid the silos effect of departments or projects.

> o Onboarding - The onboarding is a program in which all new employees go through on the first 2 weeks of their first month in the company. This program aims to introduce newcomers to the way of working of the company and its culture. Combining challenges with real time case studies it aims to create the sense of teamwork while having new employees retrieve knowledge/guidance from other more senior employees, all while learning by their own. The departments involved are the RDI and the HR.

o   Monthly Breakfast - The monthly company's breakfast is a long running event in the company's culture, happening in the last Friday of each month. This has had many formats in the past but currently has the objective of passing through some general information of the company (HR are responsible for this section), the rest of the event is interchangeable and is taken care by the RDI department, all subjects addressed in these event are firstly validated by the CEO.

o   What's new with E-goi - This is a weekly event in which the CTO does a companywide presentation/communication of the improvements/developments on the product (E-goi). This event has the objective of keeping all departments updated on the state of the Egoi product even if they don't have any interaction with it. This is of the responsibility of the Development department, specifically of the CTO

o   Goickathon - This is a yearly event located on a Saturday. Its purpose is to have and solve big ideas in a short amount of time. It is directed at all departments of the company and the CEO explains why best "We understand that we have a lot of knowledge internally that is not being passed from department to department, and who better than our employees to understand our own company's pains". Teams are interdisciplinary in order to broaden perspectives and bring different departments together. All departments are involved in this activity, and its responsibility falls on the RDI's department.

o   General communications - When there is a need to do general communications that do not require the employee's presence the communication is posted onto Bitrix (the company's internal platform).

- Department

Within each department there were found several knowledge dissemination activities, these sometimes were restricted to its own department, while others touched others outside the department.

o   Product Day - Every trimester each project manager shares with the heads of department (Sales Pme, Sales Corporate and Sac) the state of each project, what was developed, what will be and what could not be, while retrieving needs for future developments. This is the responsibility of the Development department, more specifically of the project managers, the Sales Corporate, Sales Pme and Sac also interact with the activity.

o   Sucathon - Similarly to the goickathon this event happens on a yearly basis, taking place on a Friday evening. In this event big problems are brought to light and solved by teams feely formed. It is directed at the development team as it is solely development problems that are brought to light. The Development department is the responsible and only department involved in the event.

o   Monthly share - as a knowledge dissemination activity the Sales Corporate department has a monthly meeting with the department in which one element is chosen by the head of the department to share in 20 min an experience and the techniques used to surpass this experience. This activity is done so all team members can gradually gain knowledge without necessarily interacting with the situation firsthand.

o   Shared Documentation - Still in the Sales Corporate department they have a set of shared documentation which is given to new team members in order to better understand

how the department works and its techniques. This document is solely shared within the department.

    o   Problems in 5 minutes - Within the HR and Financial department once a month a 5 minutes meeting is done in order to rapidly solve problems. These so called problems are usually situations that have stopped mid process because they need another team member's "time" with these rapid pace meetings everyone must be present in order to rapidly solve the situation, all while keeping the team updated on what is happening within the departments.

    o   Training - The company's policy shows the importance of constant growth through training, these can happen in many forms, but if a team feels the need to improve in a certain area a request is made do the HR department. Firstly, HR will check if there is anyone internal that is a specialist on the area to give the training, disseminating internal knowledge through the departments. If not, an external entity will be contacted.

- C's

At the heads of department level knowledge is shared mainly related to trimester and yearly objectives.

    o   Trimester Meeting - Every trimester all the company's heads of department meet with the CEO in order to review, share the past trimester and plan for the trimester ahead.

    o   Requirements Elicitation - Every trimester the CTO goes from department to department gathering information concerning each head of department's needs, these are compiled into a shared document and retrieved in when the next trimester is being planned.

    o   Shared Spreadsheet - Every department has its Yearly and trimester goals, projects and metrics, these are all combined into a spreadsheet shared across the entire company. The fulfillment and update of the sheet is of the responsibility of the head of department.

- Environment

With the interviews it was understood that the knowledge dissemination was not only within the boundaries of the company but also with its environment as shown in the points below.

    o   Classes & Lectures - These activities are done on a regular basis, they are the responsibility of the RDI department. Having the purpose of extending the knowledge of the company's product to the academic sector.

    o   Udemy Courses & Webinars - The online courses and webinars are developed in order to coach the product's users on all its different functionalities. They are developed by the User Experience & Assurance team since they are the main experts.

    o   Blog & Podcast- These activities are directed to current and potential users/clients of the company's products. They post different types of content from the sharing of the importance of the product to sharing knowledge of relevant subjects (mainly marketing subjects). These posts use both internal knowledge as well as the assistance of a partner company. The department that manages these communications is the Sales PME

    o   Employer Branding - In order to better communicate with the market, the company's branding its values and way of working the HR is responsible for all its employer branding activities.

Systems

In order to better understand the company's innovation process an analysis of the systems used to store and share ideas was performed as demonstrated in Figure 22.
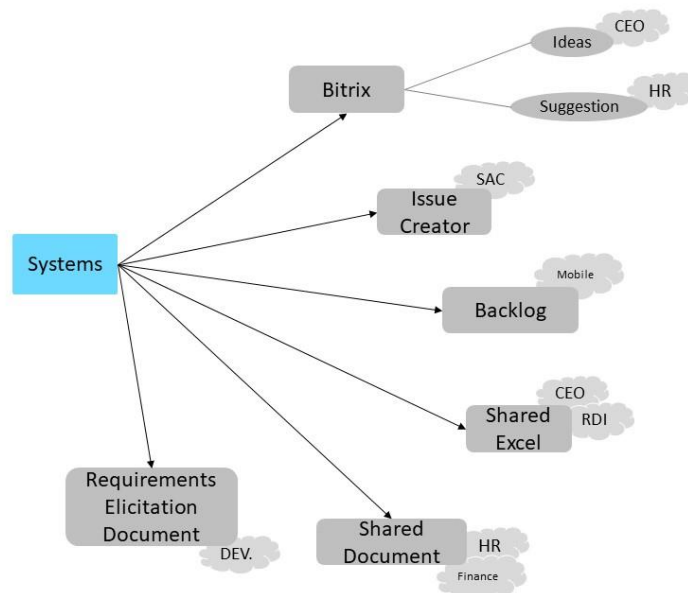

Figure 22 - Systems

- Bitrix

Bitrix is the company's internal platform used for many things, this platform is used by all employees. Related to the sharing and storing of ideas 3 main interfaces were mentioned in the interviews.

    o Ideas - The ideas menu of the platform is where any employee can post a new idea. After this idea is posted any employee can comment and vote on it. The idea needs to be approved by the CEO in order to move to production. From the information retrieved in the interviews it is currently only being used by the Sales PME department.

    o Suggestion - In the platform any employee can make suggestions through a workflow, this workflow is analyzed by the HR department and then sent to the most adequate department to be handled according to its subject.

- Issue Creator

The SAC department has a back office that allows it to create issues that are then directed to the Development department, these issues can also include ideas or suggestions since the department solely uses this channel.

- Backlog

The Mobile department has its own backlog shared within the department with the ideas and suggestions for the future sprints.

- Shared Excel

The head of the RDI department keeps a log of the ideas shared with him. This document is shared with the CEO.

- Shared Document

When an element of the HR and Finance department has and idea the head of department asks for a market study to be developed in order to evaluate its potential, this document is shared with the head of department.

- Requirements Elicitation Document

As previously referred this document is developed by the CTO, and it is where he keeps all the company's needs and ideas. this document is not shared remaining with the CTO.

Culture

Though the analysis of the interviews and the company's policies a figure was developed representing the company's innovation culture rooted in 5 key aspects as shown in Figure 23. The constant promotion of its employees growth shown through several activities and promoted by the companies policies. The importance of growth using (to certain extent) internal resources, as said in the interviews with the "*prata da casa*", the company finds it imperative to have a sustainable growth and to make use of its skilled and knowledgeable employee in the best way possible. The third aspect of the innovation culture is the company's interdisciplinarity either across departments or in specific projects, the concern is present, to have different thinking minds working together and different skills combined, in order to achieve a better outcome as well as more skilled employees. Sharing information across teams, projects and departments is present throughout the company's policies, they believe that it is important to have a birds eye view of all aspects of the company promoting several knowledge dissemination activities across the entire company. The final aspect of the company's innovation culture, retrieved from the study, is the value the company lays on the employees/departments/teams innovation efforts, understanding that when there is no recognition the motivation tends to disappear.
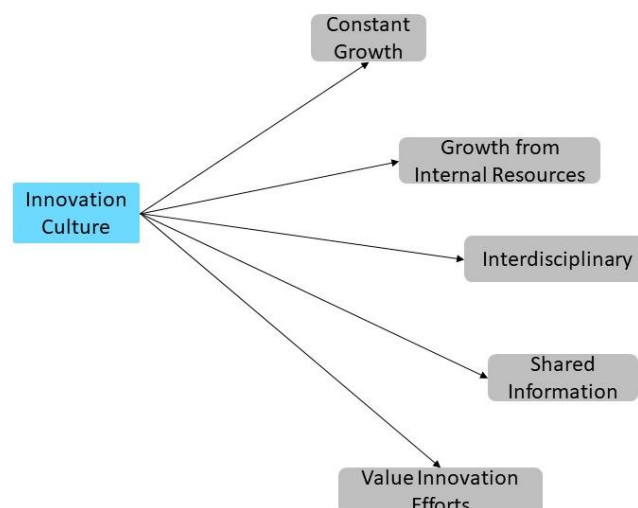

Figure 23 - Innovation Culture

APPENDIX D: Research Form

New ideas Research Form	
Criteria	**Description**
ID	
Idea Holder	
Date	
Idea Description	
What does it impact?	
What does it improve?	
Status 1	
Notes	
Status 2	
Grooming Responsible	
Notes	
Market Growth & Impact	
Business Feasibility	
Technological Feasibility	
Necessary Resources	
Estimated Effort	
Status 3	
Development Team	
Notes	

The table presented above is represents the form where all information is centralized during all of the stages of the idea management service.

It is divided into 5 groups; the first group of the form is comprised of the data presented by the idea holder in the system. Then during the screening stage, the idea will be attributed the data for the second group.

The third group is filled out is the board evaluation stage, if the idea is considered the idea is considered "for grooming" the employee's name responsible for the next stage will be present in the form. The fourth group is performed by the selected element responsible for grooming. Finally, the fifth group is filled out when the board makes it final decision. If the idea is to be moved into production the responsible team will be annexed to the form.