MESG

MESTRADO EM ENGENHARIA DE SERVIÇOS E GESTÃO

Product Management – Analysis and Improvement of Business Processes

Francisco Guilherme de Magalhães Peres Pinto Leite

Master Thesis

Supervisor at FEUP: Professor Doutor José António Faria

Supervisor at Company: Doutor Ivo Pereira

U.PORTO

FEUP FACULDADE DE ENGENHARIA UNIVERSIDADE DO PORTO

2020-07-05

To my beloved grandpa, my biggest fan.

Abstract

The present dissertation was developed with the aim of attaining a Masters qualification in Services Engineering and Management by the Faculty of Engineering of the University of Porto. The dissertation was produced in the context of a project developed in a Portuguese company dedicated to the development of a multichannel marketing automation software solution. The fast expansion of the company's turnover and workforce, the increasing complexity of the service provided, the recent changes on the Product Development department organizational model, and the reduced time horizon in which these changes took place motivated the development of this research project. The aim of the project was to analyse the product management processes and assess improvement opportunities to cope with the dynamic business reality and organizational structure in which the Product Development department operates.

The project lasted 4 months and comprised 4 phases, each one with its own goals. It started with the comprehension of the company and Product Development department especially its processes, organizational structure, evolution and context through informal interviews with employees of the company, direct observation, consultation of documents and information systems used and workshops. The information was collected and organised following a hierarchical process modelling approach. The result of this stage was the selection of a set of product management processes to be targeted in the following stages of the project, taking into consideration the importance of the process and the maturity of the current implementation.

The second phase was grounded in the identification and characterization of improvement opportunities observed in each of the selected processes using a root-cause analysis methodology. The outputs of this stage launched the third phase of the project where improvement actions were proposed.

The major problems identified in the selected processes were essentially related with three main dimensions: Processes non-uniformization; Unorganized and dispersed information; Misalignments between processes and between teams. Therefore, improvement proposals addressed these issues, namely through process redesign and development of support tools. These proposed solutions enable a more efficient achievement of the processes goals while eliminating the misalignment between processes and different teams, enabling an easy and quicker access to key information that can support informed decisions.

Then, a cost-benefit analysis was performed in order to select the improvement actions to be implemented in the last stage of the project, where in addition to the implementation was presented the evaluation of the achieved results.

Finally, these actions were prioritized according to their expected impact and difficulty of implementation, being adopted 66% of the proposed solutions, corresponding to the totality of the solutions identified in the quadrant "implement". Despite some positive results, the implementation is still ongoing and for that reason performance metrics were defined to assess the impact of these improvements.

Resumo

A presente dissertação foi desenvolvida para obtenção do grau de Mestre em Engenharia de Serviços e Gestão pela Faculdade de Engenharia da Universidade do Porto. Este documento foi produzido como resultado de um projeto desenvolvido numa empresa Portuguesa dedicada ao desenvolvimento de um software multicanal de automação de marketing. A rápida expansão do volume de negócio da empresa e da sua força de trabalho, o aumento da complexidade do serviço prestado, as recentes alterações do modelo organizacional do departamento de Desenvolvimento de Produto e o reduzido horizonte temporal em que estas mudanças aconteceram motivou o desenvolvimento deste projeto de investigação. O objetivo do projeto é analisar os processos de negócio da gestão de produto e identificar oportunidades de melhoria que possam ajudar a lidar com a realidade dinâmica do negócio bem como com a estrutura organizacional em que o departamento de Desenvolvimento de Produto opera.

O projeto teve a duração de 4 meses e contemplou 4 fases cada uma com os seus objetivos. A fase inicial consistiu na compreensão da empresa e do departamento de Desenvolvimento de Produto especialmente no que diz respeito aos seus processos, estrutura organizacional, evolução e contexto através de entrevistas informais aos funcionários da empresa, observação direta, consulta de documentos e sistemas de informação utilizados bem como de *workshops*. A informação recolhida foi estruturada através de uma abordagem de modelação hierárquica de processos. O resultado desta fase consiste na seleção de um conjunto de processos de gestão de produto, tendo em consideração a importância do processo e a maturidade da implementação existente, para serem alvo de intervenção nas seguintes fases do projeto.

A segunda fase baseou-se na identificação e caracterização das oportunidades de melhoria observadas em cada um dos processos analisados através da utilização de uma metodologia de análise *root-cause*. Os resultados desta fase lançaram a terceira fase do projeto onde foram propostas ações de melhoria.

Verificou-se que os principais problemas identificados nos processos selecionados estavam essencialmente relacionados com três dimensões principais: Processos não-uniformizados; Informação dispersa e desorganizada; Desalinhamento entre processos e entre equipas. Assim sendo, foram propostas sugestões de melhoria direcionadas a cada um destes aspetos, nomeadamente através de redesenho de processos e desenvolvimento de ferramentas de suporte. As soluções propostas permitem um mais eficiente atingimento dos objetivos dos processos enquanto eliminam o desalinhamento existente entre processos e diferentes equipas, permitindo um fácil e rápido acesso a informação chave para suportar decisões informadas.

Foi ainda realizada uma análise de custo-benefício para selecionar as propostas de melhoria a ser implementadas na última fase do projeto onde como complemento da implementação é apresentada a avaliação dos resultados alcançados.

Por fim, estas medidas foram priorizadas de acordo com o impacto esperado e a dificuldade de implementação, tendo sido adotadas 66% das medidas propostas, o que corresponde à totalidade das soluções identificadas no quadrante “implementar”. Apesar de alguns resultados positivos, a implementação ainda está em curso pelo que foram definidas métricas de performance para avaliar o impacto destas melhorias.

Acknowledgments

This document, more than just the result of many hours of work, represents the culmination of a major change in my career. Therefore, it is with such pride and gratitude (and a little bit of relief, I must admit!) that I express my sincere appreciation to the people and entities that helped me throughout the way.

To E-goi, especially to my tutor Ivo Pereira and CTO Vitor Tavares, for all the support concerning this dissertation; my colleagues Azevedo, Henrique, Diogo, Carol and Filipa who, from the first moment, took on the challenge of reviewing their practices. Without them this project would not be possible.

To team Web and team Mobile & Messaging, especially to Luís, Gonçalo, Barril and João for trusting me and accepting to be the "cobaias" in the implementation phase.

To Professor José António Faria, my advisor for this dissertation, for all the guidance concerning the structure and strategy of this project and, above all, for being an example of a great Professor and mentor, dedicated and careful with each detail.

To all Professors of Faculty of Engineering of University of Porto, especially Professor Lia Patrício (the first to believe) for giving a nurse the opportunity to show that it is possible to change a career and be successful in it.

To my close friends, who over the years have been filling my life with happy and memorable moments, for forgiving my absences.

To my family, for all the support and unconditional love. My mum, Mizé, and my sister, Filipa, examples of courage, strength and perseverance.

To my father in law, Professor Américo Lopes de Azevedo, for being a role model and for all the priceless advises and teachings and, most of all, for believe in me and in my capacity.

Finally, to my brilliant wife, Inês, a pillar of support, my confident and best friend for always being my compass.

To each and all of you, thank you!

Table of Contents

List of Tables

List of Figures

List of abbreviations

AD – Performance evaluation

APQC - American productivity & quality center

ADS – Advertisements

API – Application programming interface

APP – Mobile application

BPM – Business process management

CEO – Chief executive officer

CTO – Chief technology officer

DEV - Development

EFQM - European foundation for quality management

ERP – Enterprise resource planning

FCA – Facts, causes and acts

HR – Human resources

IT – Information technology

JQL – Jira Query Language

KPI – Key performance indicator

LATAM – Latin America

OKR – Objective and key results

PM – Product manager

R&D – Research and development

RQ – Research question

S&R – Strategy and roadmap

SaaS – Software as a service

SAC – Client support

SCC - Supply chain council

SEM – Search engine marketing

SEO – Search engine optimization

SME – Small and medium enterprises

SMS – Short message service

UX – User experience

WIP – Work in progress

WMS – Workflow management systems

1 Introduction

The first section presents insights into the research project, namely the context where the project was developed and the specific constrains explored. It also provides an overview of the research objectives for the project. The last part of the section presents the structure of the dissertation.

1.1 Project Description

The project was developed in E-Goi, a Portuguese company that is dedicated to the creation and development of a marketing automation platform that enables customers to manage their digital marketing initiatives across several communication channels.

The studied company has experienced significant growth in terms of business volume and active users having achieved a consolidation in the domestic market and a rapidly expansion in new international markets such as Latin America and Spain.

Along with growth in sales volume, the company has invested in improving the base product. To retain competitive advantage, it has significantly increased human resources, mainly qualified human resources, which turned out in more internal complexity and consequently more coordination needs.

To cope with this complexity and needs, the Product Development Department recently changed its organizational model from a functional structure to a holocratic structure sustained by the instantiation of product teams focused in certain components of the platform.

This major change was implemented in a reduced time horizon and without a previous study on this topic. This led to problems related to practices heterogeneity and losses of productivity, as well as rework increase. With the continuous need for new features and customized solutions, and with the aim of pursuing a differentiated business strategy, the company has realized that new teams need to be instantiated.

This need turned out to be an opportunity for the company to analyse what their business processes could be in order to assess future improvement opportunities.

Such an improvement environment led to the preparation of this project where the principles of business process management are applied for the benefit of the company. Employing a process-oriented approach, the project is intended to be developed in four stages:

1. characterization of the company’s business as well as its processes and management and information systems used;
2. identification of the root causes of the problems that are impacting the processes;
3. formulation and analysis of opportunity solutions to improve the efficiency and effectiveness of the model;
4. implementation of the solutions generated sustained in a philosophy of management by processes applied to this kind of businesses.

The phases of the project were focused on the processes carried out by product managers. They are responsible for the strategic and operational coordination of the product teams. Each PM autonomously manages his team using different working methodologies mostly because the processes carried out are not fully defined and automized yet. This reality results in difficulties for top management to have a comprehensive view of the department performance.

1.2 Objectives and Research Questions

Having defined the context and exposed the problem and motivation, the next step is to delineate the objectives for this project. The main objective of this research is to identify constrains in current processes and practices, develop possible solutions and implement them. In order to achieve the aforementioned objectives, the research project is grounded in the analysis of a marketing omnichannel software company, mainly in their business processes, problems impacting those processes and improvement opportunities. Another target is to adapt this model to the reality of the SaaS complexity, coping with the problems that a fast development process has in this kind of sector.

To ensure the fulfilment of the research objectives and to provide orientation for the research project, the following questions will be addressed:

- ***RQ1:*** How are Product management processes structured and what type of problems are affecting them?
- ***RQ2:*** What is/are the root cause(s) causing the problems identified?
- ***RQ3:*** Which current aspects of the product management processes can be improved?
- ***RQ4:*** How can the improvements be implemented?

1.3 Methodology

This chapter states the choices made to enable the answer to the research questions. The methodology adopted for the study is grounded in qualitative techniques employed in the perspective of a deductive-inductive approach.

Qualitative research is mainly exploratory research. As stated by Fortin (2003), an exploratory study aims to classify or describe a non-known situation. This kind of research is suited for problems that have not been clearly studied. Through exploration it is possible to further develop the studied concepts, establish priorities, develop operational definitions and improve the research design (University of Pretoria, n.d.). It is possible to identify five different types of qualitative research methods: ethnography, phenomenological, narrative, grounded theory and case study (Sauro, 2015). For the development of this research project the last one, a case study, will be used. An empirical approach is used since the data is collected not from theories or abstractions but directly from observation and experimentation.

The project is designed in two distinguished phases. Firstly, the research methodology explores a deductive approach supported by a case study-based research. Furthermore, an inductive approach is adopted with the purpose of framing a set of orientations, guidelines and practices to be considered in the context of the business domain of this research.

The global perspective of the methodology can be seen in Figure 1.

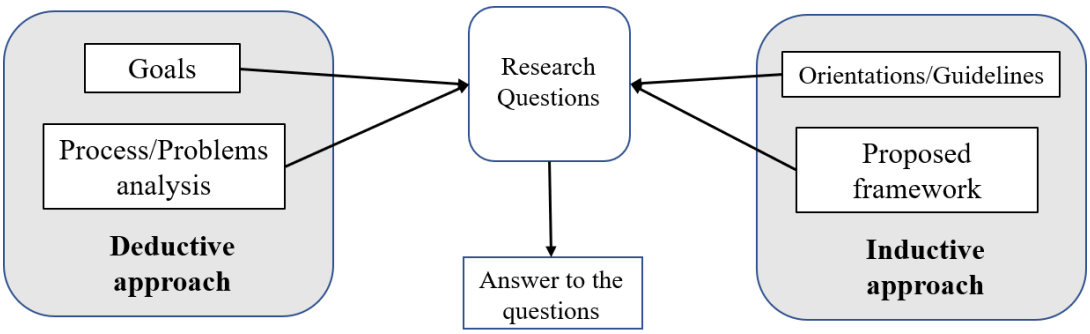


Figure 1 - Global perspective of the methodology

1.3.1 Deductive approach

The research project has started with a deductive approach. As a case study methodology was chosen, the project starts with understanding the functioning of the whole company. This step was conducted using informal interviews with key stakeholders as well as process observation. Then, the investigation focus was narrowed to the product development department and product teams. In this step, the collection of data was made using not only observation, but also document analysis and automated discovery to obtain more rich insights for the analysis and diagnose of the processes. These strategies enabled the full identification of the context and the processes used in product development teams as well as the constrains that are impacting those processes.

Another important dimension of this deductive phase was the application of a vast set of concepts and methods already developed and collected from the literature review to the data previously collected, with the objective of identifying improvement opportunities. In this step, additional workshops with product managers were performed with the aim of achieve a redesigned operating model.

1.3.2 Inductive approach

After the deductive approach and the design of the operating model, the research has shifted to an inductive approach. The goal was to frame a set of orientations, guidelines and practices that can be considered in product development teams. These solutions were the result of the lessons learnt in the previous phase and were designed with the objective of mitigating or eliminating the identified problems and coping with the challenges stated in the literature consulted. Additionally, a support framework has been induced from the data to comprise the operating model, the performance measures as well as the orientations, guidelines and practices proposed for its adoption.

Finally, the developed framework was implemented in the company context. In this final step, additional interviews and workshops were planned in order to understand the feasibility of the solution and to validate the usability of the framework.

1.4 Dissertation Outline

This dissertation is divided in seven chapters, structured in accordance to the way the work was planned and executed.

The present chapter should be viewed as an introduction to the project and aspires to present an overview of the problem in study as well as the methodological options chosen and main goals that are intended to achieve.

The following chapter comprises a review of the state of the art of topics connected to the project such as software development models, product management, business processes fundamentals and business process management.

The chapter 3 is dedicated to the presentation of the company used as a case study and is structured into three subsections: the first comprises an analysis of the company's current business situation and a generic characterization of the business model; the second part explores the organization model and key activities of product development department; and the third part includes a detailed analysis and characterization of the product management processes.

The fourth chapter embraces the identification of improvement opportunities, through the identification of the root causes and consequent problems faced in the processes.

Next, in the fifth chapter, possible solutions are presented in order to mitigate or eliminate the negative effects of the problems identified.

The implementation phase is represented in chapter 6, including how it was organized, in addition to the suggestion of the proposed improvements.

Finally, the last chapter aims to present the main conclusions extracted from the project and also to present future work recommendations.

The project roadmap and main milestones is presented in Figure 2.

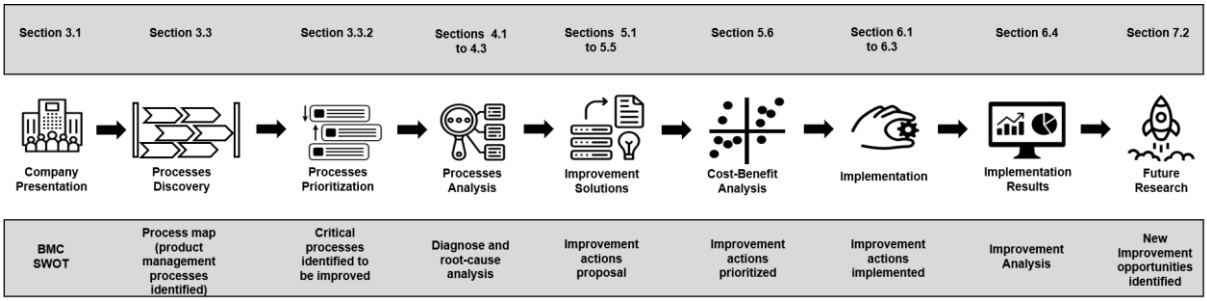


Figure 2 - Project roadmap and milestones

2 Theoretical Background

The purpose of this section is to present the theoretical foundations which supported the project development. It comprises a brief exploration related to organizational models, software development models and the fundamental aspects of business processes.

It starts with a review of different organizational models and major differences between the models.

Next, an overview of software development models is presented, from the traditional models to the agile methods.

Then, the challenges on SaaS business models are explored as well as the impact of this reality on the organization and in the choice of the software development model adopted.

Finally, a review on the fundamental aspects of business processes and business process modelling is made. It goes from the business process fundamentals, through business process management including the BPM lifecycle and the specificities of each of its phases.

2.1 Overview of Software Development Methodologies

Software development methodologies are continuously being challenged by the appearance of new technologies combined with increasingly demanding user requests (Almeida, 2017). Nowadays, software occupies an important role within organizations, being essential for the majority of businesses. For that reason, software development is becoming larger, more complex and with a demand for higher quality patterns (Almeida, 2017).

In recent years, the term “agile” has emerged in the software development area in opposition to the most traditional methodologies. The modern software projects are very dynamic and with short deadlines. For that reason, conventional methodologies inspired by the “waterfall” model are being replaced by the so-called agile methods (Almeida, 2017).

One of the critical success factors for a project is the adopted software development method (Govardhan, 2010; Bhuvaneswari & Prabaharan, 2013; Sarker et al, 2015; Almeida, 2017; Peels, 2017). Choosing the right method assumes as one of the major decisions in software companies. In order to understand what the root aspects for this selection are, the differences between conventional and agile methodologies will be presented as well as their benefits and risks. This sub-section focuses on the waterfall model and on the most used agile methodologies.

2.1.1 The Waterfall Model

Being one of the most used models in software development, the waterfall model was developed in the 70’s by Winston Royce (Lapunka et al, 2017). Despite the illustration by Royce as a flawed software development method due to its inadequacies, ironically this model ended up being the first software development methodology (Pedersen, 2013).

The model is based on a downward way where the development evolves from one phase to another. As stated by Dima & Maassen (2018), to progress to a new phase the waterfall model advocates that the previous one must be finished. This is mainly to avoid that errors from previous phases are exported to the following ones, only being detected close to the end

(Mahadevan et al, 2015). Being a model where each stage is completed before moving on to the next, the waterfall is more suitable to traditional organizations (Sarker et al, 2015). In this type of organizational models, requirements typically flow from top management to lower management and then to employees (Dima & Maassen, 2018). In this circulation of requirements, the development team has minimal or no contact with the customer or other stakeholders, hence those requirements are generally transmitted indirectly (Sarker et al, 2015).

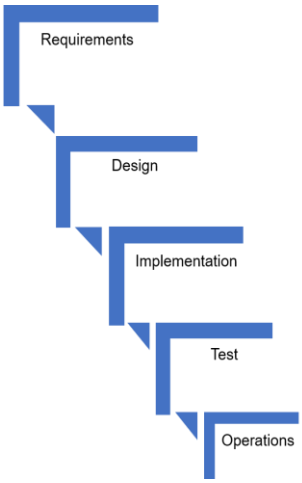


Figure 3 - Waterfall phases (Adapted from Dima & Maassen, 2018)

According to Pederson et al (2013), there are numerous interpretations on the number of stages included in the waterfall model, varying from five to seven. However, as stated in figure 3, there are 5 backbone stages in each version. In waterfall, every project starts with the requirements analysis, following a well-defined set of criteria analysis, then evolving for design, implementation, testing and operations (also known as deployment). In the requirements phase, all possible requirements are explored. In the end of this step, there is a list of all requirements for the process/system and for the software (Morgan, 2018).

The design phase starts as soon as the previous phase ends and it is also known as the solution architecture (Cusick, 2013). As stated by Morgan (2018), the design phase should comply with some rules:

1) It should be done by designers instead of analysts or programmers;
2) All the design, allocation and definition of the data processing should be done in this stage;
3) It ends with the production of a document about the system design clear to every stakeholder;
4) At least one person must have a deep understanding of the whole project (typically the person who writes the document).

The implementation and testing phases are tied up. From phase two, the project comes outlined and separated into different units. These small programs (units) can then be developed and tested to assure that it serves the purpose that motivated the development

(James, 2018). These units are developed, tested and in the end integrated into the total system (Morgan, 2018).

The last phase is the operations/deployment phase and it closes the development processes assuring that the developed software is delivered. Is a phase that goes indefinitely, since it comprises the maintenance supported for the problems detected after use starts (Pedersen, 2013).

Table 1 - Advantages and Disadvantages of Waterfall (Pedersen, 2013)

Advantages	Disadvantages
Easier to set a specific time/period for the tasks to be done;	Problematic when not all requirements are received at once;
No overlapping of phases;	Limited, since it does not allow alteration of previous phases;
Early detection of errors in the development;	Software testing occurs late in the development process;
Cost of the overall project is lower due to linear design;	As the customer continues to add requirements, not all of them are fulfilled
Formal documentation enables easy handover to customers and new workers.	Excessive documentation of the project leads to potentially wasted time;

Taking into consideration these advantages/disadvantages, it is simple to understand that the Waterfall model requires clear product requirements. For that reason, it is a methodology suitable for projects with solid requirements that will not change during the project completion (Lapunka et al, 2017)

2.1.2 The Agile Models

During the 90's, developers started to move away from highly traditional models due to their lack of ability to provide flexibility in the software development lifecycle (Kruchten, 2000). This demand for flexibility has brought the first approaches to Agile. With the emerging need to create a software production method more suitable to the market requirements, the core word started to be "agility" (Almeida, 2017). In the year of 2001, Agile was finally stated as a software development methodology, especially after a group of developers had declared the Agile manifesto, a set of guidelines that turned into a framework for agile software development (Lindstrom & Jeffries, 2004).

The major difference in Agile is the assumption that not all the work is equally critical, and for that reason the project's scope is broken down into discrete functionalities or features that are called user stories (Grech, 2015). Then, the management can pick these stories and prioritize them into a backlog of work (Grech, 2015). Other major difference in the Agile approach is the fact that Agile does not have the pretension to know all requirements before starting the development (Almeida, 2017). By focusing on these small sets of functionalities,

it is possible to deliver testable versions of the software to the client and collect feedback for new requirements (Almeida, 2017).

Principles behind the Agile Manifesto

We follow these principles:

- Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
- Welcoming changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
- Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to shorter time scales.
- Business people and developers must work together daily throughout the project.
- Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
- The most ef cient and eff ective method of conveying information to and within a development team is face-to-face conversation.
- Working software is the primary measure of progress.
- Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace inde nitely .
- Continuous attention to technical excellence and good design enhances agility.
- Simplicity — the art of maximizing the amount of work not done — is essential.
- The best architectures, requirements, and designs emerge from self-organized teams.
- At regular intervals, the team re ects on ho w to become more effective, then tunes and adjusts its behavior accordingly.

Figure 4 - Agile Manifesto (Lindstom & Jeffries, 2004)

The basis of agile development rests on the idea of development co-responsibility between those who perform development functions and business functions (Lindstrom & Jeffries, 2004). Representatives of both functions work closely during the project providing and analysing status reports daily (Mahadevan et. al, 2015).

All the development lies in short iterative cycles that go from designing, coding, to testing (Grech, 2015). Requirements are constantly evaluated, and features are prioritized and can be upgraded and downgraded (Mahadevan et al., 2015).

Instead of focusing on documentation, Agile is driven by adaptability, flexibility and speed of delivery (Lindstrom & Jeffries, 2004). In the end, it can be represented by an iterative cycle were the goal is to assure that the final product meets the specifications (Lindstrom & Jeffries, 2004).

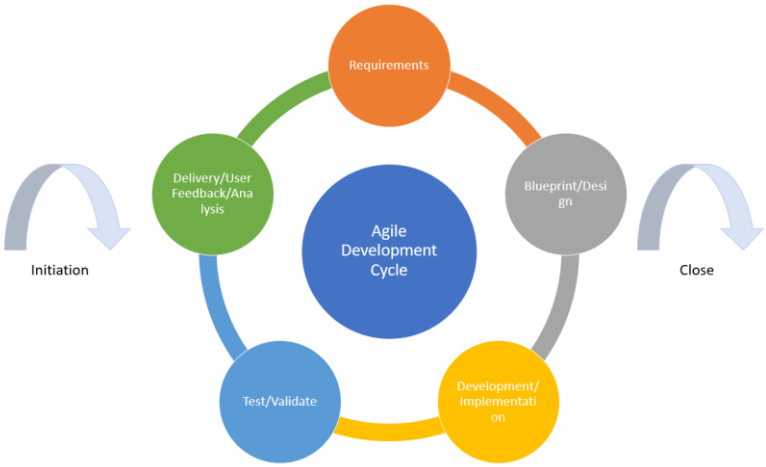


Figure 5 - The Agile Process (Adapted from Pedersen, 2013)

In the end, the key aspects of agile methods are simplicity and speed (Abrahamsson et al, 2002). The software development is an incremental process (small releases with rapid cycles), collaborative (customer and developers working together with close communication), straightforward (easy to learn and to modify), and adaptative (prepared for last minute changes) (Pederson et al, 2013).
Due to the agile environment philosophy of customer interaction with open communication and minimum documentation, the agile methods are currently the most popular models in the IT industry (Lapunka et al, 2017). The most used agile methodologies, among others, are SCRUM (Schwaber, 1997), extreme programing or XP (Beck, 1999), test-driven development or TDD (Beck et al, 2003), KANBAN (Anderson & Dumitriu, 2005) and SCRUMBAN (Ladas, 2008).

SCRUM

The term “SCRUM” was first mentioned in the Takeuchi & Nonaka (1986) paper “New New Product Development Game”. The origin of this term came from the inspiration on a teamwork rugby strategy that has the objective of “getting an out-of-play ball back into the game". Takeuchi & Nonaka (1986) identify six characteristics in new product development processes: Built-in instability; Self-organizing project teams; Overlapping development phases; Multilearning; Subtle control; Organizational transfer of learning. They present these characteristics as pieces of a jigsaw puzzle that combined can produce a new set of dynamics that increase speed and flexibility (Takeuchi & Nonaka, 1986).

The SCRUM approach has been adopted to manage software development processes following the experiments of Sutherland and Schwaber. According to Schwaber (1997), SCRUM is defined as set of activities that combine known and workable tools and techniques with development teams to build software.

It was developed to help the software development management process achieve flexibility and velocity (Schwaber & Beedle, 2002). Due to its high importance for organizations, software is nowadays larger, more complex and demanding (Almeida, 2017). SCRUM is the enhanced version of the commonly used iterative/incremental development cycle, but able to cope with extremely dynamic projects with short deadlines (Schwaber & Beedle, 2002).

This methodology empirically puts in place the ideas sustained by the industrial process control theory, adapting them to software development (Schwaber, 1997). With this approach, concepts like flexibility, adaptability and flexibility can be the root for software development.

Rather then define a specific software development technique for implementation, SCRUM concentrates on how the team should be organized in order to flexibly produce in a constantly changing and demanding environment (Schwaber & Beedle, 2002). In fact, Schwaber (1997) advocates that the development process occurs in an environment of variability where requirements, time, frame, resources or technology are likely to change during the process.

Schwaber & Beedle (2002) present the SCRUM process in three phases: *pre-game, development and post-game* (Figure 6).

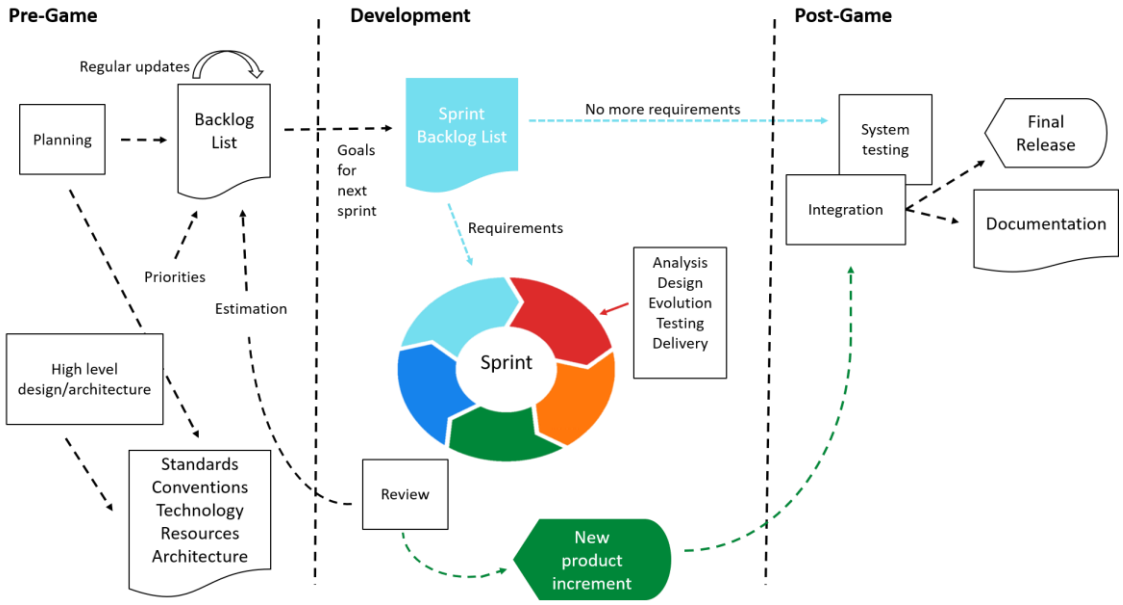


Figure 6 - Scrum process adapted from Schwaber & Beedle (2002)

The SCRUM process starts with the *pre-game phase*, composed by two sub-phases: planning and high-level design/architecture. The planning stage includes the definition of the project to be developed and drives the creation of the product backlog (Schwaber & Beedle, 2002). A list of all requirements prioritized and estimated composes the product backlog. And this list should be updated and reviewed at least once each iteration (Linz, 2014). As stated by Schwaber & Beedle (2002), high-level design/architecture is done having in mind the current items in product backlog.

The *development phase* represents the agile part of the SCRUM methodology (Linz, 2014). It is organized in iterative cycles also known as sprints that include traditional phases of software development: analysis, design, evolution, testing and delivery (Schwaber & Beedle, 2002).

The closure of the release is the *post-game phase* and comprehends the final release and the documentation of the developed project (Linz, 2014). To reach the post-game phase, all stakeholders should agree that all requirements were accomplished (Schwaber & Beedle, 2002).

KANBAN

Kanban has its origin in 1940s with the development of a scheduling and inventory control system by Taiichi Ohno, an industrial engineer in Toyota (Sly, 2018). The term Kanban evolves from the Japanese words “Kan” and “Ban”, meaning respectively sign and board (Ordysinski, 2013). This methodology was constructed as a visual tool that works as a traffic signal, sending clear signals about when to start, slow down and stop production (Ordysinski, 2013). Rather then a simple inventory control system, Kanban can be considered a system to

visualize work, making it flow, while it also reduces waste and maximizes customer value (Corona & Pani, 2013). The Kanban system enables workers to replenish materials only when they are consumed, resulting in an efficient downstream process (Sly, 2018).

In 2003, Mary & Tom Poppendieck started to explore some Lean principles in the context of software development. In this approach, there were identified seven key principles that derivate from lean: eliminate waste; build quality; create knowledge; defer commitment; fast deliveries; and pay respect to people (Poppendieck & Poppendieck, 2003).

The door for including in software development concepts like JIT (Just in time), Kaizen, Muda or Kanban was definitely open (Corona & Pani, 2013). According to Corona & Pani (2013), the final objective is to build a value stream map that can eliminate the waste (Muda) and improve the value-added steps (kaizen).

One of the most important lean tools to help manage the workflow is the pull system, which is normally visualized using a Kanban board (Sly, 2018). Being one of the hottest topics in software development, Kanban is becoming the key Lean practice in this field (Corona & Pani, 2013). The Kanban software development process can be defined as a WIP (work in progress) limited pull system that is visualized through Kanban boards (Corona & Pani, 2013).

With the boom of Agile methodologies, Anderson (2003) introduced some concepts such as flow, bottleneck, visual control and cumulative flow diagram into software development discussions. Later on, these concepts were incorporated into the Kanban method, giving it some consistency and helping to sustain the idea that a Kanban board helps to minimize WIP (Corona & Pani, 2013).

As stated by Ladas (2008), the whole lean/Kanban approach is based in two axioms:

> *"It is possible to divide the work into small value-adding increments that can be independently scheduled"*; *"It is possible to develop any value-adding increment in a continuous flow from requirement to deployment"*.

This means that the software development process can be decomposed in a sequence of well-defined activities that can be performed and implemented by the team members (Corona & Pani, 2013).

According to Corona & Pani (2013), a simple example can demonstrate that in a cycle we have a requirement analysis phase that is followed by a design phase, then by an implementation phase, then by a testing phase, then an integration phase, ending in a deployment phase.

All the method is based on the use of a Kanban board and a set of cards (Sly, 2018). Each column of the board represents one activity and the overall board represents the sequence of activities, while the cards represent the features under work (Corona & Pani, 2013).

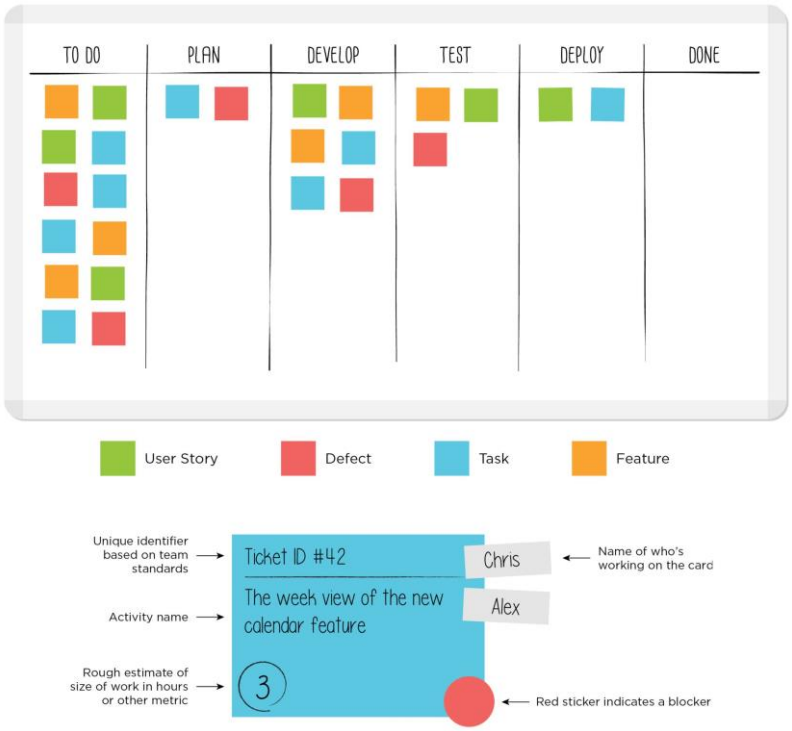


Figure 7 - Software development Kanban board

This method allows to rapidly visualize the work assigned to a development team represented in different types of work tasks with different status (Ladas, 2008). By analysing the different cards, it is also possible to see who is working on the task as well as the estimated time for the work to be developed.

Traditionally, Kanban is implemented simply using a board and a set of post its to write with a marker. As stated by Mahnic (2014), the application of Kanban principles in software development is becoming an important issue.

With the crescent use of Kanban, several software companies start to invest in project management tools that support electronic Kanban boards such as Jira, Trelo, Favro, Monday, Proofhub, Kanbanize, Kanbanflow among others.

SCRUMBAN

The term SCRUMBAN was first proposed by Ladas (2008) and it represents a hybrid solution that mixtures SCRUM and Kanban. It comprises a mixture of SCRUM's ceremonies with Kanban's visualization, WIP limits, pull system and continuous flow (Mahnic, 2014).

SCRUM and KANBAN can provide multiple guidelines, principles and constrains, when used isolated are "lightweight methods", while combined can provide high levels of product quality (Albarqui & Qureshi, 2018).

According to Stoica et al (2016), the development methodology SCRUMBAN combines the benefits from the two described methods, collecting from SCRUM the easiness of managing

cooperation projects through sprints and from KANBAN the limits applied to the work in progress, as well as the visualization of the workflow provided by the use of a board.

Most of the development requires up-front planning, especially when it is made from scratch. For that reason, the scrum practices give the necessary (or even inevitable) support, while the KANBAN provides the flow that supports the development cycle (Mahnic, 2014).

To effectively combine these two methods, it is necessary to understand the value provided by both frameworks in order to design an improved framework that can meet needs (Albarqui & Qureshi, 2018).

The SCRUMBAN framework is more similar to KANBAN, since it is a pull system that is activated according to the different needs or continuous flow (Albarqui & Qureshi, 2018).

It has a KANBAN board to manage open queues instead of product backlog. However, it prioritizes the work according to demands, uses ceremonies such as daily or retrospective meetings, and advocates the use of cross-functional teams like SCRUM (Albarqui & Qureshi, 2018).

Table 2 - Differences between SCRUM and KANBAN adapted from Stoica et al, 2016

SCRUM	KANBAN
Team involved in iteration	Involvement is optional
Uses speed as a measure for improving processes	Uses deadlines/lead time for improving processes
Sprint backlog belongs to a team	Board may be shared
Uses at least 3 roles (Product owner, SCRUM master, SCRUM team)	Does not use roles
SCRUM board is reset at the end of a sprint	KANBAN board is persistent
For each sprint priorities are established based on backlog	Establishing priorities is optional

The SCRUMBAN methodologies focus on the differences between the two methods, extracting the strengths in order to build a more suitable framework that provides higher capacity of adaption with high quality development (Ladas, 2003). Analysing the differences presented in table 2, it is possible to identify and highlight what some characteristics of the SCRUMBAN methodology can be.

Table 3 - SCRUMBAN principles

SCRUMBAN
Team involved in iteration
Uses deadlines/lead time for improving processes
Backlog belongs to a team
Uses cross-functional teams
KANBAN board is persistent
For each sprint priorities are established based on backlog

According to the strengths of SCRUMBAN, it is possible to understand that the team's effort is optimized to achieve the quality standards that were assumed for the project (Albarqui & Qureshi, 2018).

It is a method suitable for those who pretend a smooth transition from SCRUM to KANBAN or simply wish to make their development process leaner, more transparent and continuously optimized (Mahnic, 2014).

According to Ladas (2003), for companies that have never tried Agile but intend to apply a pull workflow, the SCRUMBAN framework is easy to implement and provides potentially high acceptance results.

2.2 Overview of Product Manager Role and Functions

The product management role it is an extremely difficult role. The PM needs to lead product teams to combine design and technology in order to solve customer problems while met the needs of the business (Cagan, 2017).

As stated by Banfield, Eriksson & Walkingshaw (2017), the product manager is the person who identifies the customer's needs and business objectives, defines a vision of success for the product and gather a team to transform that vision into reality.

Being a product manager demands a strong set of skills and strengths, and to succeed the PM needs to be the strongest talent within a company (Cagan, 2017).

To manage their products PM's balance between three disciplines (user experience, technology and business) and they need to perform hard decisions and trade-offs (Banfield, Eriksson & Walkingshaw, 2017).

The figure 8 represents the position of the product manager in the intersection of those disciplines.

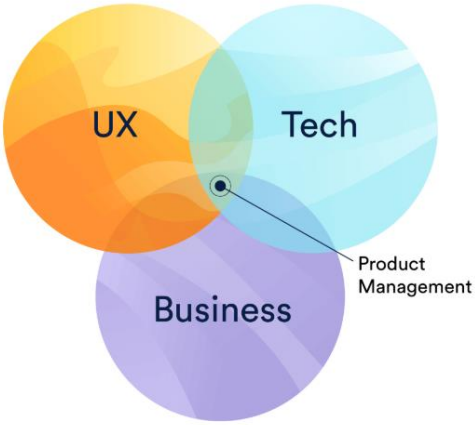


Figure 8 - Dimensions of product management adapted from Banfield, Eriksson & Walkingshaw (2017)

Cagan (2017) identifies some key responsibilities for a product manager:

- Deep knowledge of the customer;
- Deep knowledge of the data;
- Deep knowledge of the business;
- Deep knowledge of the market and industry.

The day-to-day activities of a product manager are wide-ranging and as described by Banfield, Eriksson & Walkingshaw (2017) can be systematized in:

- understand and represent the customer's needs;
- monitor thethe market to create competitive advantage;
- Define the product vision and strategy;
- Ensure the alignment of the stakeholders around the product vision;
- Prioritize features and capabilities;
- Empower teams to achieve independent decision-making processes.

This set of responsibilities and activities require a high bundle of skills. As stated by Cagan (2017) being a product manager is clearly different from being a designer or a project manager, being more approximated to the role of a CEO, due to the need of having a deeply comprehension of all aspects of the business.

The aim of a product manager is to ensure a business outcome more than ensure how a product is designed and developed (Banfield, Eriksson & Walkingshaw, 2017). To achieve this goal, it requires a good understanding not only of technology but also in all interrelated

aspects of business like financial, marketing, sales, legal, partnerships, customer environment or user experiences (Cagan, 2017).

When trying to define the role of a product manager is frequent to find it described as a product owner role.

The product Owner is responsible for the development team of engineers and is a critical piece to ensure team success in the development of useful and usable software (Sverrisdottir, Ingason & Johansson 2014).

The product manager is the strategist who defines the lifecycle and path for a product (Banfield, Eriksson & Walkingshaw, 2017). For that reason, look to the product manager as a product owner is a common misunderstanding of the role essence.

While being a product manager is a job function, being a product owner means that someone performs a role in an Agile team (Cagan, 2017).

Each development team should have their PO or PM that is responsible by the creation and manage of the backlog and monitors the project, but that does not mean that it is the same role (Yuonan & Mamedov, 2020).

The product manager defines the direction of the product through research, vision-setting, alignment and prioritization, while the product owner works close to the development team ensuring that the team executes considering the goals defined (Banfield, Eriksson & Walkingshaw, 2017).

To summarize, the table 4 presents the major differences between a product manager and a product owner.

Table 4 - Product manager vs Product owner

Product Manager	Product Owner
Works with outside stakeholders	Works with internal stakeholders
Define the product vision	Helps teams execute on a shared vision
Outlines what success looks like	Outlines the plan for achieving success
Owns vision, marketing, ROI	Owns team backlog and fulfillment work
Works at a conceptual level	Works involved in day-to-day activities

In product companies these two roles cannot be divided, and it is critical that the product manager also be the product owner (Cagan, 2017). In fact, the product owner responsibilities are a small part of the product management role, being vital that the product manager covers both (Cagan, 2017).

2.3 Business Process Fundamentals

Companies around the world face an increasingly fast paced environment and to succeed they must incorporate business processes.

A business process can be defined as a set of activities logically connected and triggered by events, that allow the transformation of resources (information, materials, etc) into outputs valuable for the stakeholders involved or for the organization (Trends, 2013a).

They are composed of interrelated activities and governed by business rules, embedded in the context of their relationship with other activities in order to provide a vison of sequence and flow (ABPMP, 2013).

Business processes can represent a source of competitive advantage since they can affect the customers perception of quality of the service provided, as well as the perception of the efficiency with which it is delivered (Dumas et al., 2018).

Every process has an internal or external customer, and for that reason every activity within a company can be considered either a business process or a part of it (Andersen, 2007).

2.3.1 Business process classification

Through the years, there has been an effort from many authors to classify business process. Thus, several different classifications can be found. Simultaneously, there are a group of interest organizations composed by the Supply Chain Council (SCC), the European Foundation for Quality Management (EFQM) and the American Productivity & Quality Center (APQC) that are working on providing cross-industry process classification models that can be used by a large number of companies (Andersen, 2007). This group intends to propose the standardization of different business processes, specifically regulatory or industry-specific, that can enable their identification and their categorization (Andersen, 2007).

The most common and accepted categorization model is the Value Chain Model, proposed by Porter (1985), that divides business processes into two categories: the value-creating processes named Core processes (primary activities) and the non-value-creating processes named Support processes (Porter, 1985).

According to Porter (1985), core processes are the ones that belong to the organization's value chain and are directly related to the provision of products and services to the customers (e.g. manufacturing, sales, delivery). On the other hand, support processes are not part of the value chain but are responsible for the successful accomplishment of the core processes (eg. Human resources management, accounting) (Porter, 1985).

Other researchers expand this model by adding a third category of processes. This category, known as Management processes, comprises a set of guidelines and strategic directions for the core and support processes, leading them to a higher level of performance (eg. Partner management, activity plan, annual budget) (Dumas et al., 2018).

2.3.2 Business process modelling

Business process modelling as a graphical representation of business processes or workflows is used to translate the understanding of a process for all the stakeholders as well as to clarify assumptions and objectives or test alternative scenarios (Andersen, 2007).

Business process models are used to represent how processes look and work in current days (AS-IS model), as well as the improved version (TO-BE model) (Dumas et al., 2018).

One of the major concerns for process analysts is to define the appropriate level of detail of the model (Andersen, 2007). If the model is overly detailed, it could become too complex to understand. On the other hand, if the model is too generic, some relevant parts of the process can become hidden (Andersen, 2007).

As proposed by Andersen (2007), to overcome this concern the most effective way is to perform hierarchical modelling with different levels of detail. Other important aspect related to business process modelling is the idea that its objective is to extract value, and for that reason from the moment a given detail level is no longer generating value, the modelling should stop (Sharp & McDermott, 2009).

There are several techniques to perform business process modelling such as: Business process architecture (commonly known as business process mapping), flowchart, swimlane (or cross-functional flowchart), responsibility matrix. The selection of the technique depends on the characteristics of the analysed process. However, all these models have in common the fact of always highlighting the work to be done (tasks), the sequence of the execution (workflow) and who executes it (actors) (Sharp & McDermott, 2009).

2.3.3 Business process measuring

When defining or redesigning business processes, it is crucial to establish performance measures to ensure that they were properly developed and are aligned with the context of the organization and producing the desired outcomes (Ramias & Wilkins, 2010b).

Defining, implementing and using performance metrics in business process is a huge challenge, mainly because of the cross-functional nature of the business process (Ramias & Wilkins, 2010a); hence, most of the times, interdependent decisions and actions have to be taken (Ramias & Wilkins, 2010a).

There are several perspectives to measure business processes, but the most used ones are related to time, cost, quality and flexibility (Dumas et al., 2018). According to Andersen (2007), environmental impact, safety or business ethics should also be considered when measuring business processes. However, when establishing the performance measures, the chosen ones must reflect the organization strategy, mission, vision and objectives (Van Looy & Shafagatova, 2016).

Process performance measurement should consider two fundamental dimensions. The efficiency dimension measures the productivity and costs that are directly related to the production and delivery of the product/service (Azevedo & Faria, 2018). On the other hand, the effectiveness dimension measures the capability of the value proposition to cope with customers' needs and is associated with the quality of the product/service (Azevedo & Faria, 2018).

Andersen (2007) presents a division of the process performance measures into two categories: leading and lagging metrics. Leading measures comprise the factors that can have impact on the future results of the company by anticipating its performance (Harmon, 2007). Lagging measures are related to the outcomes of the process or of a company, reflecting the consequences of the decisions taken previously (Harmon, 2007). To have a more complete overview of the process, these two perspectives should be measured simultaneously (Andersen, 2007).

2.4 Business Process Management (BPM)

Business process management is a discipline that includes a set of structured concepts, models, tools and techniques used to discover, analyse, redesign, implement and provide monitoring to business processes (Azevedo & Faria, 2018). Through the years, BPM

discipline has evolved by incorporating in their core some principles brought by other disciplines such as Total Quality Management, Operations Management or Lean Six Sigma (Trends, 2013b). Those principles were integrated and combined with information technology tools to assure that both business processes and strategic goals of organizations are aligned (Trends, 2013b).

BPM as a paradigm is an evolution of previous concepts such as business process reengineering and it is an outcome of a set of publicized empirical studies that demonstrated the increased performance of process-oriented organizations compared to non-oriented ones (Dumas et al., 2018). On the other hand, the appearance of modern process-centred IT systems such as Enterprise Resource Planning systems (ERP) or Workflow Management systems (WMS) also contribute to highlight the importance of BPM (Dumas et al., 2018).

According to Dumas et al. (2008), BPM can be defined as an iterative cycle composed by six main stages: process identification, process discovery, process analysis, process redesign and process monitoring.

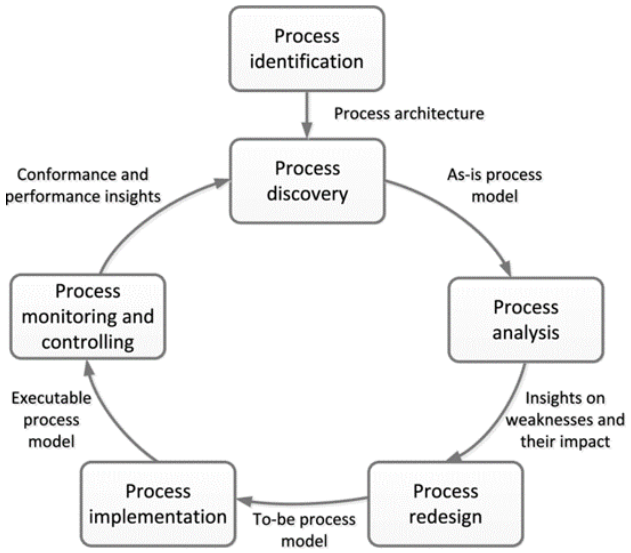


Figure 9 - The BPM lifecycle (Dumas et al., 2018)

The first step of BPM comprises the identification of the processes that will integrate the process architecture (also known as business process map). This map includes not only the process identification but also determines the boundaries and relationships between the processes (Azevedo & Faria, 2018).

Organizations should decide which processes should be considered in the BPM activities and integrated in the business process map.

There are several criteria to perform this selection, but generally the most used criteria are: strategic importance, health and feasibility (Dumas et al., 2018). The first criterion guarantees that the selected processes are aligned with organization's strategic goals. On the other hand, the second is oriented to identify problematic processes that can benefit from the BPM activities. When the focus is to select the processes where the results are more realistic and rational, the criterion used is the feasibility criterion.

After the process architecture is settled, the discovery step starts. In this step, all the collected information about the current state of the processes is gathered and documented in process models (Dumas et al., 2018).

This is one of the most demanding activities, due to the fact that processes are performed by several resources that had not always been in contact with business modelling techniques before. This may represent additional involvement of the analyst in order to remove any conflicting or overly detailed knowledge that may be provided (Dumas et al., 2018).

There are several methods that can be selected to perform this process discovery. Each method has strengths and weaknesses. So, most of the times a combination of different methods is used to gather as much information as possible (Dumas et al., 2018).

Table 5 - Process discover methods adapted from Dumas et al. (2018)

Method	Strengths	Weaknesses
Document Analysis	Structured information; Independent from stakeholders' availability;	Outdated material; Wrong level of abstraction;
Observation	Context-rich insights;	Potentially intrusive; Stakeholders likely to behave differently; Only few cases and not all processes can be observed;
Automated Discovery	Extensive set of cases; Objective data;	Potential issue with data quality and level of abstraction; Data may not be available or be available only in part; Data extraction and preparation is time-consuming;
Interviews	Context-rich insights;	Requires sparse time of stakeholders; Time-consuming: several iterations required before sign-off;
Workshops	Context-rich insights; Direct resolution of conflicting views;	Requires simultaneous availability of multiple stakeholders; Time-consuming: multiple sessions typically required;

Process analysis is dedicated to the detection of opportunities for process improvement (Dumas et al., 2018). To analyse problems affecting the performance of as-is processes, qualitative and/or quantitative techniques can be used (Andersen, 2007). Some examples of

process analysis can be found in literature such as value-added analysis, root cause analysis, facts, causes and acts (FCA) analysis, fishbone diagrams, five whys analysis, pareto analysis, role activity diagrams, among others.

When the processes are identified and analysed, the aim is to develop possible solutions or improvements to overcome the identified problems and allow organizations to achieve its performance goals (Dumas et al., 2018). This stage, named process redesign, is also commonly defined as process improvement for these reasons.

After redesigning the to-be version of the process, the implementation phase is launched and generally requires organizational change management and/or process automation (Dumas et al., 2018). Andersen (2007) segments the implementation phase into different subtasks to achieve the success: assess and prioritize the implementation proposals, develop an implementation plan, blossom a positive change atmosphere and execute the implementation plan.

The last step of the cycle is the process monitoring. When the implementation is performed, the performance of the redesigned process is analysed to determine the success of the BPM initiative (Dumas et al., 2018). As told before, this cycle is iterative and for that reason, if new problems are identified, these outputs will represent new inputs for new BPM initiatives.

3 Case Study Description

The present chapter is dedicated to the description of the case study. In the first section, a presentation of the company used in this case study is offered as well as an overview of their business model.

In order to achieve a more complete understanding about the company business and operating model, the second section is dedicated to the Product development department, presenting its organizational model and key activities.

After understanding the company, the context in which it operates and the dynamic of the department, a following section provides an overview of product management processes and how they interact with the mission of the department. The first subsection comprises the product management architecture.

Having in mind the nature of the project and the amount of existing processes, only part of them can be given further analysis. The second subsection provides an overview of the selected processes, namely *Strategy & Roadmap planning, Backlog management and Team performance management*. In this section it is also presented the criteria used in its selection and the motivation to elect them.

3.1 Company and Business Overview

3.1.1 Company presentation

The studied company is a Portuguese company that is dedicated to the development of an Omnichannel Marketing Automation tool. This tool developed by E-goi, Lda enables their customers to create and manage integrated actions through several channels such as Email, SMS, SmartSMS[1], Voice, Web push[2], Push notification[3], Ads[4] and Slingshot[5] to communicate with their databases. The platform also captures and processes customers/subscriber's behaviour enabling companies to automatically react to their actions, adapting the promotional content and format according to their preferences. Finally, it is possible to segment and manage customer databases and benefit from the support of analytical and behavioural reports also provided in this tool.

The company's vision is to enable the connection between final customers and brands, and customers and suppliers, generating synergies that can represent higher levels of satisfaction and value creation. Its mission is to develop intuitive digital communication solutions that can be implemented in any business reality of any geography. enabling the maximization of results while respecting the customers and their privacy.

The platform E-goi is a software product with a SaaS delivery model that is exclusively available on the internet. Any person can create an account and experience a trial period of 30

[1] Text message containing a link to a landing page

[2] Instant notifications via browser

[3] Notifications via mobile devices

[4] Advertising in channels like Google or Facebook

[5] Transational email and text messages

days and then choose a plan according to his needs. There is no loyalty period which enables any unsatisfied customer to downgrade his plan or cancel at any time.

The company is vertically integrated (Appendix A), having full control of the whole value chain. That includes not only the development of the platform but also all other activities such as marketing campaigns, after-sales support services or even R&D of new functionalities or products.

E-goi has evolved from being an advertising agency back in 2008 to become fully focused on developing and offering one marketing automation solution: the E-goi platform. Through the years, the domestic position has been consolidated and the company was also able to expand to international markets across Europe and Latin America (mainly Spain, Brazil and Colombia), opening the first delegation across borders in 2020 in Brazil. Accompanying this growth, the work force has also been rising progressively from 14 employees to 120+ nowadays.

3.1.2 Business model

The major purpose of a business model is to describe how a company can create and capture value while delivering products or services to customers. There are different tools to represent a business model; however, the business model canvas (BMC) is one of the most used ones due to the capacity of easy visualization of the whole business.

This visual tool is used to characterize business models as well as to provide support to managers in the formulation of hypothesis about how to manage their businesses. It is a framework with nine blocks that represent the main areas of a business and should be delineated following a logical structure: Customer segments, value proposition, channels, customer relationship, revenue stream, key resources, key activities, key partnerships and cost structure (Osterwalder & Pigneur, 2010).

To characterize the business model of the company, a BMC was developed (Appendix A). The main aspects documented are described in the following points:

• It is possible to identify two different customer segments - *Corporate and small and medium companies (SME)* - with distinctive value propositions. Despite the different needs and features of these two segments, the company has a common offer for both;

• The close relationship with its customer segments is a priority for the company and is reached through content creation (blog, e-books), search engines (SEO and SEM), public relations, paid advertising (social media, AdWords, etc.), public relations initiatives with communication partners and the provision of customer support;

• The key resources are highly qualified human resources, market knowledge, technological know-how, hardware and software components (Data Centers, APIs, etc.) that are imperative for the business model to work;

• The critical activities such as product development, provision of customer support and account management are the main source to provide value to the customer segments;

• The revenue streams come mainly from subscription and usage fees paid by customers;

• It is possible to identify strategic partners that help the company in many fields such as customer base growth, development of new features of the product/service and access to key resources;

• The main costs supported by the company are IT/Infrastructure maintenance, human resources and marketing/sales initiatives.

For a deeper understanding of how the company operates and uses its business model, an analysis of its strengths, weaknesses, opportunities and threats (SWOT) was also conducted. This tool (Appendix C) was very helpful to summarize the relevant aspects related with the internal and external environment of the company as well as the impact on strategy development. This tool is usually used by managers as a support for future courses of action, especially to address how the company's strengths and weaknesses can cope with the changes of the business environment (Johnson, Scholes, & Whittington, 2008).

3.2 Product Development Department

As in any SaaS company, the product development department represents its backbone (Appendix D). This department ensures that the best product is developed to respond to customer needs, overcoming the competitors market offers. As previously stated, the SaaS model increases pressure in the velocity of the development, demanding fast paced releases of improvements and new features. Despite this velocity culture, the department has a crucial objective of maintaining consistency in the product and taking the most benefit of the company resources, delivering new products with an efficient and effective use of those resources.

3.2.1 Organization model

As stated in the project description, the Product development department has undergone a major transformation in the past year. To cope with the increasing complexity and needs of the company and as a response to the rapidly growth of the human resources, the organization model of the department has changed. Since the foundation until 2019, the department was using a functional structure and now has developed a holocratic structure based on two groups of focused teams.

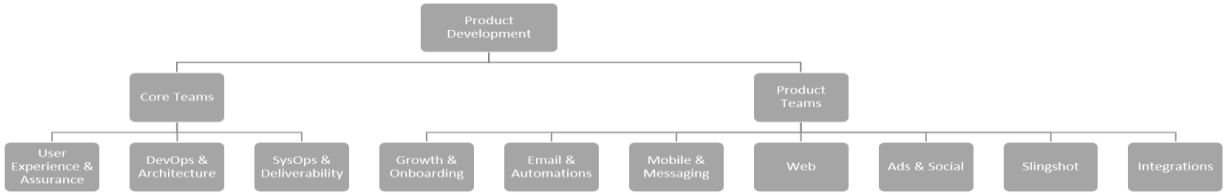


Figure 10 - Department organigram

The structure adopted is based on the Spotify squad model. The Swedish company has adapted the Scrum framework, basing their structure in small teams with a maximum of 8 team members called Squads (Kniberg, 2014).

These teams are self-organized and have full autonomy to decide what is the scope of development according to the general strategy defined for the product. The major advantage is the velocity of the development that is increased due to the reduction of the decision chains (Kniberg, 2014). Other main advantage is the possibility to grant better alignment between the squads and the entire company strategy, being also a scalable model were the squads are part of tribes (Kniberg, 2014).

The studied company also faced the same objectives and had a need to reduce the chain of decision, giving velocity to the development process. Looking to the department it is possible to identify two tribes: one composed by product teams and another which englobes the core teams.

3.2.2 The Product teams

As stated before, E-Goi platform is a marketing automation platform that provides to their customers the ability to capture new customers and to communicate with them through automatically deployed messages in several channels.

The product teams are responsible for different components of the platform ensuring their scope of development as well as guaranteeing the product maintenance.

The product responsibility is divided for the different teams, assigning different components to each one:

- **Growth & Onboarding:** Responsible for managing the following components: Account, Affiliates, Advanced reports, Community, ChatGoi, Dashboards, Lists, Partners, Plans, Payments, Results and Senders;
- **Email & Automation:** Responsible for managing the following components: Automation, Campaign analyser, Email broadcast, Resources and Split tests;
- **Mobile & Messaging:** Responsible for managing the following components: App – GoiMeUp, App – TinyGoi, Push notifications, SMS broadcast, SmartSMS broadcast and Voice Broadcast;
- **Web:** Responsible for managing the following components: Forms, Surveys, Pop-ups, Landing pages and Webpush;
- **Ads & Social:** Responsible for managing the following components: Facebook Ads, Google Ads, Instagram Ads, Microsoft Ads and Social manager;
- **Slingshot:** Responsible for managing the following components: Registered, Shortener, Transactional e-mail, Transactional SMS, Transactional push notifications and Verify;
- **Integrations:** Responsible for managing the following components: App – WeeGoi, App – Sync2Egoi, Goidini, Integrations and Plugins.

3.3 Product Management AS-IS Characterization

After understanding the company and its business and how the product development department is organized, the focus shifted to the comprehension on how the department operates to create and deliver value to the company.

To perform this characterization, this subchapter is divided in two subsections. In the first section, a generic characterization of the product department business processes and the correspondent process architecture is presented. In the second section, a detailed analysis of the different processes as well as the prioritization model used to select the processes explored in the next stages of the project is framed.

3.3.1 Process Architecture Analysis

Despite some previous approaches in the studied company to business processes modelling, there was no documented processes architecture. The first step of the analysis was focused on building the company process map. For that reason, informal interviews with key stakeholders were performed and observation of the employees performing their daily tasks and processes was also conducted. As the focus of the project was centred in Product management processes, the investigation was narrowed to the product development teams in order to identify a possible value chain for those teams. A previous draft of what could be a business process map was built based on the result of interviews with the different product managers combined with the result of direct observation of product managers daily routine.

To validate this draft and reach a final version (Figure 11), a workshop with the different stakeholders (CTO and Product managers) was performed.

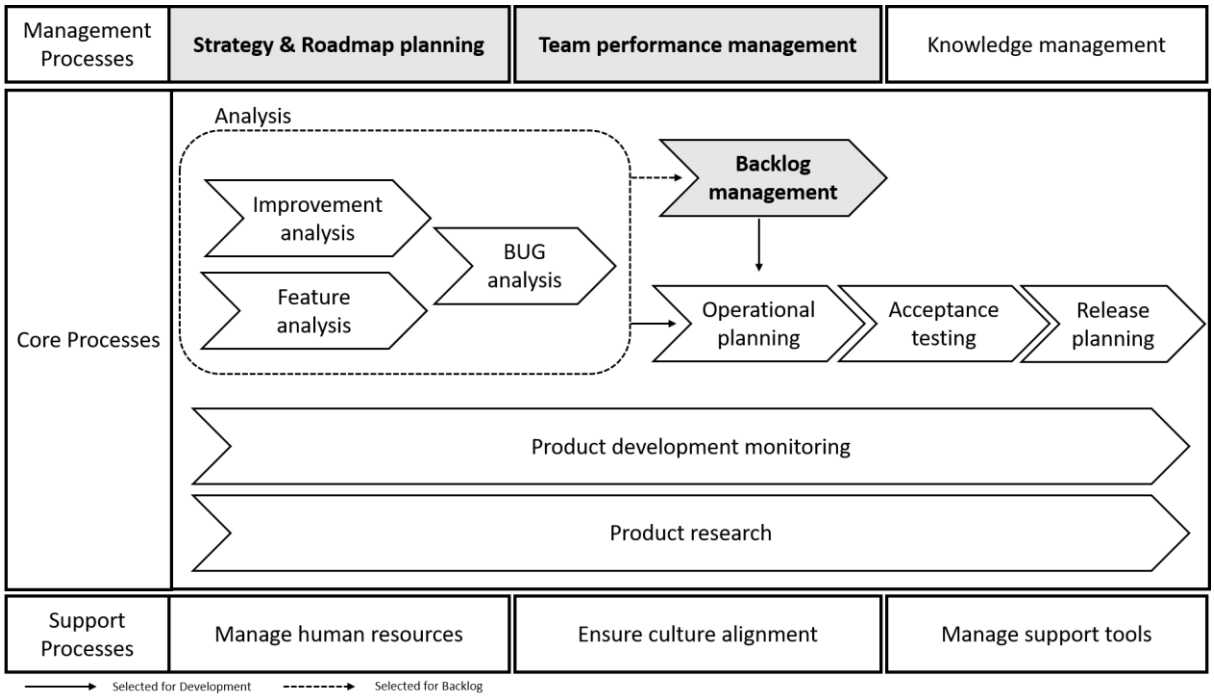


Figure 11 - Product management process architecture

In product management activity the following core processes were identified:

- ***Bug Analysis:*** this process is triggered by the existence of a new Jira[6] issue with type "Bug". Its main activities comprehend the bug exploration, the score & estimation, and the progression decision. It aims to analyse and identify the behaviour of the reported bug, identifying possible intervention.
- ***Improvement Analysis:*** this process is triggered by the existence of a new Jira issue with type "Improvement". Its main activities comprehend the bug exploration, the score & estimation and the progression decision. It aims to analyse the suggestion and impact in the functionality, as well as the trade-off between UX improvement and development effort.
- ***Feature Analysis:*** this process is triggered by the existence of a new Jira issue with type "New Feature". Its main activities comprehend the bug exploration, the score & estimation and the progression decision. It aims to analyse the suggestion and investigate the development effort and possible inclusion in roadmap.
- ***Backlog Management:*** representing one of the backbones of product teams, this process has different triggers. It is triggered every time a new Jira issue is added to the backlog. Every month, before the "monthly planning" meeting, the process is triggered. Its main activities include backlog grooming, issue reassessment and selection for development. Its main objective is to ensure the effective development of the different issues according to prioritization and estimation.
- ***Operational planning:*** this process is triggered every week in the "weekly planning" meeting. Its main activities comprehend the selected issues review, team members distribution and plan accomplishment monitoring. The process mission is to guarantee the balanced distribution of the selected issues for the different team workers.
- ***Acceptance testing:*** this process is triggered every time a new issue is resolved. Its main activities comprise issue testing and progression decision. The main objective is to ensure that the development complies with the requirements.
- ***Release planning:*** this process is triggered every time a Jira issue changes status to "ready for development". Its main activities include analysing the trade-off between the developed issue and the strategy & roadmap plan, and progression decision. It aims to ensure the strategic deploy of issues.
- ***Product development monitoring:*** this process is a continuous process and one of the backbones of product teams. The whole process is dedicated to continuously monitor the development process.
- ***Product research:*** this process is triggered every time a Jira issue changes status to "ready for development". Its main activities comprise market exploration, competitor's analysis and feature/improvement proposal. The main objective is to warrantee that the product remains updated with market standards as well as to ensure product innovation and competitive advantage.

[6] Jira® software is an Atlassian tool build to help development teams organize their work helping them to plan, track and release feature development.

Aligned with core processes, there are management processes that could also be identified:

- ***Strategy & Roadmap planning:*** this process is triggered every quarter before the "quarter plan" meeting. Its main activities include quarter analysis, strategy & roadmap proposal, strategy & roadmap feedback, and strategy & roadmap plan validation. The main purpose is to define the strategy & roadmap for the team.
- ***Team performance management:*** this is a continuous process that has the objective of managing the performance and career progression of the team. Its main activities include daily monitoring, monthly feedback and quarter evaluation.
- ***Knowledge management:*** this is a continuous process that aims to ensure appropriate knowledge transfer and proper product documentation. Its main activities include featuring documentation, knowledge base reviewing, updating documentation and updating the knowledge base.

To ensure that the product teams can work properly and have the conditions to develop the core processes, some support processes were also identified:

- ***Manage human resources:*** this is a continuous process that has the goal to ensure the human resources needs of the team. Its main activities comprise team member requirements communication, onboarding, team member exit communication and know-how transfer.
- ***Ensure culture alignment:*** this is a continuous process that aims to ensure that the team is aligned with the department/company culture. Its main activity is to advocate culture.
- ***Manage support tools:*** this is a continuous process that aims to ensure that the team has the proper support tools. Its main activities include managing tools, evaluating tool needs and tool requests.

To have a better understanding of the operating model, it is mandatory to frame the different stakeholders involved in the identified processes as well as to define the kind of responsibility that is attributed to each functional role in this context. These stakeholders are represented through the following roles:

- ***CEO:*** He is the main responsible for managing the company and, in this context, is also the final decision maker for strategy & roadmap planning.
- ***CTO:*** He is the board member responsible for the coordination of the product development department and has an important role in strategy & roadmap planning. He is also the main decision maker in product development, receiving feedback from the different teams.
- ***Tech lead:*** He is the main responsible for technical decisions regarding product architecture and technical standards. In this context, he has an important role in release planning and in providing feedback to assist a product manager in team performance management.
- ***Product manager:*** He is responsible for managing all aspects related to a product team, including resources, people, projects, product development among other responsibilities. He is the main responsible in ensuring that the team achieves its goals.

- ***Lead developer:*** He is the team member responsible for supporting the product manager in technical decisions regarding the product development. He has also an important role as a mentor for the team and in operational planning.
- ***Developer:*** He is the team member responsible for developing the features associated to the product components in a product team.

One of the major challenges of defining a process architecture is to define not only the purpose or the trigger of a process, but to have a total comprehension of it, including the inputs/outputs and the process boundaries (Azevedo & Faria, 2018). With the aim of providing a full vision of the identified processes, a second workshop was planned with the aim of creating a fact sheet for each process. A process fact sheet is a tool that is used to systematize all the critical information collected throughout the process identification phase supporting modelling efforts and process analysis (Jacka & Keller, 2009). The gathered information was structured in a set of process fact sheets, represented in Appendix E.

3.3.2 Overview of Product management processes

In the first stage of this project, the critical processes were identified and delimited. Due to the limited period of the project and given the internal resources available before proceeding to next steps, it was crucial to select the processes to be targeted. The mapped processes were evaluated in two criteria: the importance of the process and the maturity of the implementation.

To every product manager, it was asked to vote for each process. After the votes from the seven PM's (Appendix F) and by looking to the average of the criterion importance, it is possible to identify that there is no significant variation between the processes, all the processes having higher levels of importance. On the other hand, the criterion maturity presents a wide variety, with some processes having lower levels of maturity, demonstrating a need of intervention.

Analysing the figure 12 below and looking to the different quarters that combine importance and maturity, it is possible to identify the top processes needing to be improved.

In management processes, the selection points to the "Strategy & roadmap planning" and "Team performance management". There are also some core processes identified as a priority, such as "Product research", "Backlog Management" and "Acceptance testing".

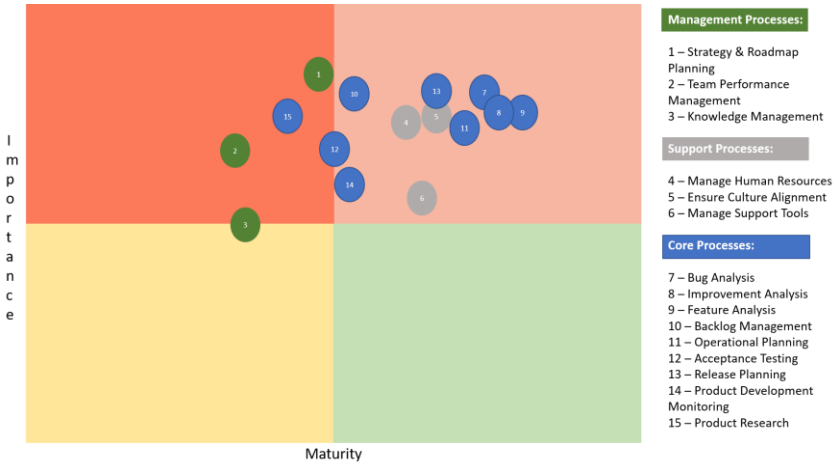


Figure 12 - Processes analysis prioritization

Taking that into consideration for the next stages of the project and also to act as pilots, the company has selected two product teams, the selection had in consideration the three process with higher importance and lower maturity identified by those teams. Narrowing this prioritization to the "web" and "mobile & messaging" teams, the selected processes (highlighted in figure 11) for analysis and intervention are:

- "Strategy & roadmap planning";
- "Backlog management";
- "Team performance management".

3.3.2.1 Process Strategy & roadmap planning

As owners of the development cycle of the product, one of the most relevant functions of product managers is to define the roadmap and the strategy of the development team. This management process is highly connected to the department and the company's overall strategy. The process is triggered every quarter and the product manager defines a proposal for the next quarter roadmap after analysing the past quarter and having in mind what is expected from the product in terms of evolution.

It is not a fully internal team process since for some of the main activities, the main accountable is external to the product teams, having the CTO/CEO taking the final decision. Firstly, the product manager reviews the past quarter KPI and OKR and analyses if the roadmap was accomplished. After this comprehensive analysis, the product manager elaborates a proposal of the plan and roadmap for the next quarter and submits for the CTO give feedback. In the strategy & roadmap feedback, besides the feedback of the submitted plan, the management strategic needs are also presented. This activity ends with the final version of the strategy & roadmap plan that is presented to the CEO for him to validate.

3.3.2.2 Process Backlog management

Unlike the process mentioned in the previous section, the "backlog management" is a fully internal process, since all the activities are performed by the product manager himself. It is one of the backbone processes for product managers since all teamwork is based on the team backlog. The product backlog is the most important tool for a development team, since it comprises all the tasks that should be accomplished during the product lifetime (Albarqui & Qureshi, 2018). As the product backlog should be composed by updated, prioritized and estimated requirements (Linz, 2014), this process has different triggers.

Every time a new Jira issue is added to backlog, the process is triggered to assure that this new task is estimated and prioritized considering the existing ones. Every month, the issues that were not updated in the past month should be reassessed, representing a new trigger for the process.

The process starts with the grooming of the existing backlog. That enables the selection of possible tasks that need to be reassessed. The second activity comprises the reassessment of the ones that are not updated. It ends with the pre-selection/selection of the issues that should be included in a further development cycle.

3.3.2.3 Process Team performance management

The main objective of this process is to guarantee that the performance and progression of the team is continuously monitored. To assess the performance of a team, there are key performance indicators (KPI) that are settled and combined with objective key results (OKR). Also, to monitor the performance of every team member, there are individual KPI.

Since team performance management is a continuous process, it does not have triggers. Rather, it is composed by a set of activities that enable the daily monitoring, the monthly evaluation feedback and the quarter evaluation.

The daily monitoring is based on the work planned for the day. It evaluates the efficacy (work done) and efficiency (time spent/ time estimated) of the team members.

The monthly feedback includes a review of the past month developments in terms of efficacy and efficiency, but also the quality of the work developed. It is also an opportunity to evaluate if the team is achieving the proposed and negotiated targets. In the end, it includes constructive feedback in how to overcome possible problems and insufficiencies in order to accomplish the goals planned.

The quarter evaluation is a review activity that ends with an evaluation report that is provided to the human resources department for career progression. It includes the team member auto evaluation, the retrospective analysis on efficacy, efficiency and quality of work as well as the final assessment of the team KPI/OKR. It is also the privileged moment to provide feedback and to set new goals for the next quarter.

4 Problem identification and Characterization

Having a full comprehension of the processes and having selected the priority ones, the following chapter is dedicated to the identification of improvement opportunities. For this process analysis, qualitative techniques, namely root-cause analysis, were applied.

The result of workshops and the observation of participants performing their activities enabled the identification of the problems and its possible causes for the selected processes. As it can be stated by observing the process fact sheets, the processes are widely connected and, for that reason, the identified problems have repercussions in many other processes.

4.1 Problems on Process Strategy & roadmap planning

As previously referred, this process comprises one of the most relevant functions for a project manager.

Currently this process does not have a clear uniform definition of the flow and activities that should be performed. This fact causes misinterpretation in the different teams, resulting in different approaches being held. For the process, there are several inputs and the information is provided by the use of different tools (for eg. *google docs*, *bitrix24*[7] posts, information in *Jira*, etc) that are not integrated between them.

The collected information as well as the roadmap plan produced does not have a standard framework to be used to summarize all the information. This brings an important improvement opportunity to solve a major problem of dispersed and unorganized information.

Another identified problem in this process is that all the flows are unidirectional, and the decision-making is characterized by a top-down approach. Despite having in mind that the process have different activities (it goes from the review of past quarter through the proposal of a roadmap plan and it ends by being validated by the top management), the reported problem of dispersed information is the root of another problem: the lack of key information for decision making. As the information is not clear, the operational information most of the times is not considered in the negotiation.

For that reason, this negotiation ends up in a unidirectional decision. On the other hand, the company long-term strategy is not shared and visible to the middleman management (including product managers) and this fact compromises the analysis and proposal of a plan representing also lack of key information to drive the decisions.

As mentioned before, the studied company develops and offers one marketing automation solution, and for that reason it does not have different products in that market, but one product composed by different components. In such an environment, it is possible to identify several dependencies between the different product teams. Thus, alignment is crucial to the success. The process does not have a standard framework implemented to systematize the information and some dependencies (especially in backlog tasks) are not clear for other teams. Additionally, as the process is not uniformized and is performed by the different product

[77] Internal collaborative tool that provides workgroups, meeting room scheduling and internal chat among other features.

managers, the strategy & roadmap plan of each team is not visible and clear for the other teams. This causes misalignment between the different teams' roadmaps.

In summary, problems and root causes identified in the process Strategy & roadmap planning are structured in table 6.

Table 6 - Problems and root causes identified in the process Strategy & roadmap planning

P1	**Dispersed and unorganized information**	
	C1.1	Non-uniform process
	C1.2	Use of non-integrated multiple platforms to document information
	C1.3	Lack of a framework to summarize the information
P2	**Lack of key information for decision-making**	
	C2.1	Unidirectional decision-making
	C2.2	Operational information not considered in decision-making
	C2.3	Company long-term strategy is unknown
P3	**Misalignment between different product teams roadmap**	
	C3.1	Different teams' dependencies are not clear
	C3.2	Strategy & roadmap plan is not visible for other teams
	C3.3	Non-uniform process between different teams
	C3.4	Lack of a framework to summarize the information

4.2 Problems on Process Backlog management

Managing backlog is vital to the overall core processes of the team. Having an updated backlog enables all the touchpoint processes to be improved.

The company values the prioritization model implemented. It is an adapted Moscow prioritization where the top scored issues are labelled as "must do", the ones in the middle as "should do", and the less scored ones with "would not do".

There is a policy established that all issues in backlog should be estimated and prioritized, but there are no rules settled to reassess scores, neither a specific tool exists to support the backlog grooming.

Other than that, this is a process that is not uniformized, depending on each product manager self-judgement. These facts result in a problem of lack of frequent reassessment that is harmful to issues with low scoring that over the time keep being overcome by new issues and end up lost in backlog.

Nowadays, the process is not triggered by the strategy & roadmap plan. To define the strategy & roadmap plan, decisions should be taken considering the most updated information. For that reason, each quarter the process "backlog management" should be triggered.

Also, as stated before, the lack of a tool to support backlog grooming discourages the reassessment and update of scores and estimations. In the end, it is common to identify misalignments between the priority score attributed to the different issues and the priorities settled in the roadmap plan.

In summary, problems and root causes identified in the process Backlog management are structured in table 7.

Table 7 - Problems and root causes identified in the process Backlog management

P4	**Lack of frequent reassessment**	
	C4.1	Non-uniform process
	C4.2	Backlog is organized top-down by a Moscow prioritization
	C4.3	Prioritization value remains without reassessment
	C4.4	Lack of a tool to support backlog grooming
P5	**Misalignment between priority score and roadmap**	
	C5.1	Non-uniform process
	C5.2	Strategy & roadmap plan is not a trigger for priority reassessment
	C5.3	Lack of a tool to support backlog grooming

4.3 Problems on Process Team performance management

As previously mentioned, this continuous process exists to guarantee the uninterruptedly monitoring of the team members performance, ensuring their progression.

Being a continuous process, it is mandatory to have rapidly access to updated information to support the monitoring and feedback. This rapidly access to information is compromised by the lack of a framework to summarize the information and specially because information is dispersed in several platforms that are not integrated (for eg. different google sheets, jira issues detailed info).

Adding to that, the process is not uniformized and the different product managers have implemented different approaches to the process. These facts highlight a problem of unorganized and disperses information that urges to be solved.

As all the processes that include team performance, giving feedback is crucial. Nonetheless, the information that supports feedback should be relevant. The previous problem reported is related to the new problem identified. As the process is not uniformized and due to some lack of constant monitoring, it is difficult to have the KPI and OKR updated. For that reason, the data available for feedback is not sufficient or relevant to support proper feedback.

The need of daily and monthly monitoring was identified by the product managers. However, the identified lack of a framework that summarizes the information compromises these objectives. Nowadays, the feedback is made based on the PM perception and not with the support of real data. This means that the feedback provided is not representative to highlight improvement opportunities or to help the team members to improve. The exposed facts underline a lack of continuous monitoring and feedback that can end in the misevaluation of the team, as real performance only be assessed in the end of the quarter.

As stated before, the monitoring and feedback is based on perceptions and does not use the same data that is used to evaluate each quarter. Each product manager does his own feedback, not following a uniformized process and without relevant data. For this reason, the members of the team cannot have access to information and lack perception about their performance

during the quarter. This causes an issue of lack of key information for performance improving that can lead to dissatisfaction in the different team members.

In summary, problems and root causes identified in the process Team performance management are structured in table 8.

Table 8 - Problems and root causes identified in the process Team performance management

P6	**Unorganized and dispersed information**	
	C6.1	Non-uniform process
	C6.2	Use of non-integrated multiple platforms to document information
	C6.3	Lack of a framework to summarize the information
P7	**Lack of continuous monitoring & feedback**	
	C7.1	Non-uniform process
	C7.2	Lack of constant monitoring (Update OKR/KPI)
	C7.3	Lack of a tool to support daily and monthly performance assessment
	C7.4	Lack of data to support continuous feedback
P8	**Lack of key information for performance improving**	
	C8.1	Non-uniform process
	C8.2	Lack of informed feedback
	C8.3	Lack of perception of performance during the quarter

5 Proposal and Development of Solutions

In the previous chapters, the answers to *RQ1* and *RQ2* were provided. Having identified how the processes are organized, what the problems are and the root causes that affect them, the next phase of the project is dedicated to the development of solutions.

The aim is to identify and map possible solutions that can be implemented to mitigate the identified problems, thus answering *RQ3*.

Using the concepts and methodologies introduced in the second chapter to perform process redesign as a basis, in this chapter there are presented feasible and adjusted solutions to cope with the problems, having in consideration the product managers business context. In this stage, additional workshops with the different product managers were performed to generate possible solutions to implement. For each process and according to the different identified problems, a set of proposed actions is presented which aims to facilitate the product managers daily activities.

Given the limited period of the project and the internal resources available, not all solutions proposed were selected to be implemented. To select the ones to implement, the following actions were analysed in two dimensions – difficulty of implementation and expected impact – enabling the selection of the priority ones to implement in the scope of this project.

5.1 Process Strategy & Roadmap planning

To address the improvement opportunities identified in chapter 4.1, the following action proposals were developed:

A1 – Process redesign to include bidirectional flows of decision

As stated in chapter 4.1, currently the flows of the process are unidirectional, following a top-down approach. These improvement solutions aim to systematize the process to allow the correct definition of the different activities as well as the roles of the different actors and the documents produced.

A2 – Development of an integrated tool to centralize all the inputs to S&R plan

This solution proposes the creation of a centralized tool that integrates with the different sources of inputs (for eg. *google docs*, *bitrix24*[8] posts, information in *Jira*, etc) and present all the possible needs that can drive the roadmap for next quarter in the same tool.

[8] Internal collaborative tool that provides workgroups, meeting room scheduling and internal chat among other features.

At the same time, it is intended to automatically load in the next quarter the unperformed tasks from the previous roadmap plan.

A3 – Development of a tool to share cross-teams needs

The proposed solution aims to provide a tool that can be used by all product managers to document cross-team needs. This tool would be used to document the different needs and dependencies between teams in order to achieve alignment in the different product team's roadmap.

A4 – Automatic generation of notifications when the quarter is ending

This solution aims to assist product managers in the opportune filling of the quarterly needs tool (A3) through the deploy of automatic messages, alerting them to it. It is suggested to take advantage of the potentialities of the E-Goi platforms by setting an autoboot that is triggered in specific conditions.

The proposed action will contribute to guaranteeing that all product managers can share their needs and dependencies between each other before they need to deliver a proposal of a strategy & roadmap plan.

5.2 Process Backlog management

To address the improvement opportunities identified in chapter 4.2, the following action proposals were developed:

A5 – Process redesign to include backlog reassessment

In this process, as described in chapter 4.2, rules for backlog reassessment do not exist. In parallel, there is a lack of some process triggers. This improvement aims to create these rules and activities to prompt the backlog reassessment, and at the same time to introduce a new trigger for the process to be performed. Besides, with this process redesign it will be possible to identify the roles of the actors, the produced documents, and milestones.

A6 – Development of a Dashboard to manage and groom the backlog

As previously stated, most of the activities of a product manager depend on having a well-managed backlog. Having that in mind, it is crucial to develop solutions that can allow product managers to efficiently reassess their backlog to have it updated and with the desired

behaviour. To achieve this goal, a "backlog groomer" dashboard is proposed to be developed. To achieve this goal, some changes in Jira are required to happen:

- Creation of filters based on team components and with the prioritization model applied;
- Creation of filters based on team components and last update date;
- Creation of filters based on team components, issue type, creation date and resolution date;
- Creation of a dashboard in Jira based on those filters.

5.3 Process Team performance management

To address the improvement opportunities identified in chapter 4.3, the following action proposals were developed:

A7 – Process redesign to enable continuous monitoring

In chapter 4.3, it was demonstrated that the product managers identify the need for continuous monitoring. As the process is not uniform, despite that perception of need, it is not clear when and how to perform this monitoring. Also, the milestones are not well defined. This improvement solution intends to systematize the process to allow the correct definition of all the inconsistencies.

A8 – Development of a Dashboard to monitor the work performed

As mentioned before, to rapidly gain access to information, it is critical to support monitoring and feedback. This improvement suggests developing a "Team performance" dashboard. To achieve this goal, some changes in Jira are required to happen:

- Creation of filters based on team members' weekly and monthly planned work;
- Creation of filters based on team members' weekly and monthly work accomplishment;
- Creation of filters based on team global work accomplishment;
- Creation of a dashboard in Jira based on those filters.

A9 – Development of a tool to monitor team members KPI and team KPI/OKR

The proposed solution intends to provide a tool that can be used by all product managers to monitor the evolution of team KPI/OKR and the team members KPI. This tool is proposed to be integrated with the different sources of inputs to calculate the different indicators (for eg. google sheets and Jira information).

5.4 General improvements

Considering the different processes analysed in chapter 4 it is possible to identify problems that have common causes between them. Mostly related to lack of information, use of multiple tools that disperse information and uniformized processes. The following proposals aim to mitigate those causes and related problems.

A10 – Development of a Department Wiki manual

Nowadays the processes are not uniformized nor documented. The development of this manual will enable the quick identification of the redesigned processes. The documentation of the processes and procedures will contribute to (Ungan, 2006):

- Assure the preservation of knowledge and information that is available;
- Identify improvement opportunities, since the manual provides a clear picture of the processes, allowing process analysts to easily notice problems;
- Train and help new workers to understand their job roles as well as the processes they will be involved in;
- Guide experienced workers as they can consult these documents when needed;
- Achieve and guarantee consistency in service provision;
- Mitigate risks and possible conflicts among employees.

Wikis are server-side web software developed to be used as collaborative work tools (Aigrain, 2003). As stated by Delacroix (2015), the company processes are complex and for that reason it is crucial to manage them with simple tools that are easy to work with like wikis.

The main aim of this improvement is to create a tool that is available at any time and that can ease the access to updated information. For that reason, it is proposed that the manual be developed in a wiki website, taking advantage of the collaborative philosophy, allowing the different workers to contribute to the continuous improvement of processes and procedures.

A11 – Review of department onboarding training program

Due to the widely presented problems with information and processes, it is very difficult for a new employee to know exactly which processes are used in the department, as well as their triggers, objectives, activities, or milestones.

This proposal intends to review the content of the department onboarding training program to include a workshop related to product managers processes as well as the tools used.

A12 – Development of an integrative platform for product managers

Currently in the department, there are different tools used by product managers such as:

- Jira platform - used to manage the software development, enabling the planning, tracking, reporting, dashboard creation/visualization.
- Bitrix24 – used to communicate between team and department through chat, posts. It is also used to set tasks not related to software development. The platform also enables workflow automation of some tasks.
- Google drive - used as team repository.
- Google sheets/Google docs – used to document different aspects of the teamwork and to calculate and monitor KPI and OKR.
- Admin – e-goi management database software used to collect information about customers and customer interaction with the company. It is used, for instance, to calculate some team KPI.

The proposal is to internally develop an integrative platform that enables product managers to access all the needed information at the same place. It is proposed to be integrated with the used sources of information (for eg. admin and Jira) and comprehend all developed tools to groom backlog, manage the team performance, elaborate the strategy & roadmap plan, team repository, department wiki manual as well as to provide the different dashboards needed for visual management.

This platform can also be used to improve other functionalities addressing non-analysed processes such as “operational planning” by integrating a tool for sprint planning.

5.5 Proposed solutions vs Improvement opportunities

To easily comprehend the relation between the proposed improvements and the problems and causes that they address, a summary table was developed (table 9).

This table details the match between the proposed actions and the problems and causes identified in chapter 4.

Table 9 - Match between proposed solutions and improvement opportunities identified

Process	Problem	Cause	Action
Strategy & Roadmap Planning	P1	C1.1	A1, A10, A11
		C1.2	A2, A12
		C1.3	A2, A10, A12
	P2	C2.1	A1, A2
		C2.2	A2, A3, A4, A12
		C2.3	A1, A2, A12
	P3	C3.1	A1, A3, A4
		C3.2	A2, A12
		C3.3	A1, A10, A11
		C3.4	A3, A10, A14
Backlog Management	P4	P4.1	A5, A10, A11
		P4.2	A6
		P4.3	A5, A6, A12
		P4.4	A6, A12
	P5	5.1	A5, A10, A11
		5.2	A5
		5.3	A6, A12
Team Performance Management	P6	C6.1	A7, A10, A11
		C6.2	A9, A12
		C6.3	A8, A9, A10, A12
	P7	C7.1	A7, A10, A11
		C7.2	A7, A8, A9, A12
		C7.3	A8, A9, A12
		C7.4	A8, A9, A12
	P8	C8.1	A7, A10, A11
		C8.2	A8, A9, A12
		C8.3	A8, A9, A12

5.6 Cost-benefit analysis

Due to the limited timeframe of this project, not all the proposed solutions are feasible to implement. Taking in consideration the improvement solutions to address the problems identified, a cost-benefit analysis to select the solutions to be implemented was performed.

In the context of BPM initiatives, this sort of analysis is often completed due to the scarcity of resources available and the timeline proposed to implement all the developed solutions. Given these constrains, companies normally tend to start implementing the solutions that are expected to produce greater effects or that are easily implemented. To sort the selected improvement solutions, there are several criteria that can be applied (Andersen, 2007).

For this project, the defining factors considered were:

- Expected improvement effects.
- Difficulty of implementation, namely in terms of required time of implementation, associated cost and level of collaborative effort needed.

Generally, when improvement solutions are developed, they are expected to generate increased positive benefits and at the same time to be easy to implement. The focus is to develop solutions that do not take much time to be implemented, do not have significant cost associated and do not require the intervention of many employees, especially from other functional units. However, trade-offs must be naturally considered. For the assessment of the implementation priority, a four-quadrant matrix was applied (Figure 13).

Taking in consideration the results obtained in the referred matrix, the solutions selected to be implemented are A1, A3, A4, A5, A6, A7, A8 and A9. The solutions that were not selected to implement can become part of a roadmap for further improvement.

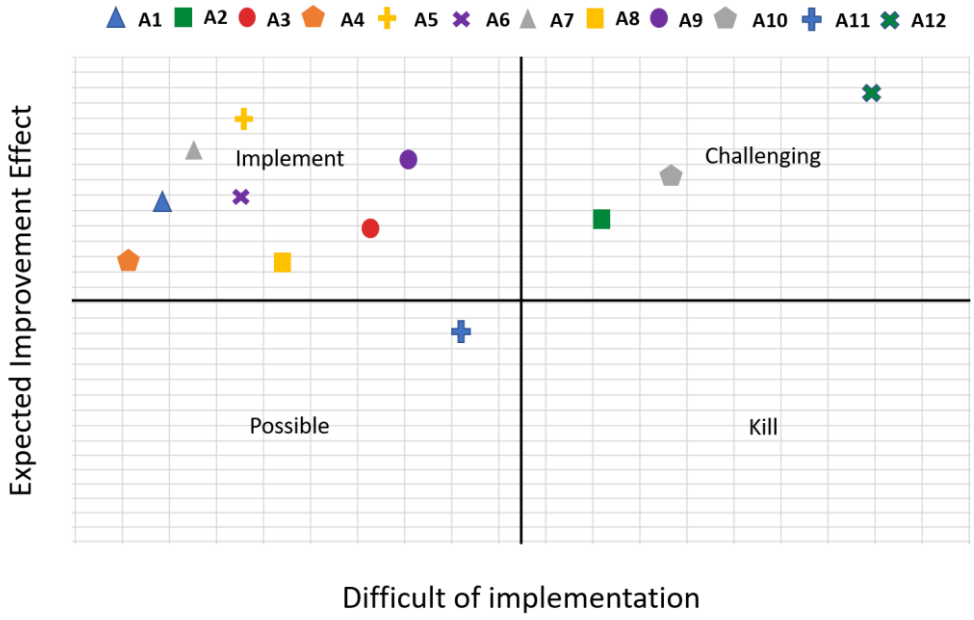


Figure 13 - Cost-benefit Analysis

6 Implementation and Evaluation of Results

After selecting the improvement proposals to implement, this chapter is dedicated to expose the process implementation as well as the outlined monitoring, addressing *RQ4*.

Given the project timeframe, the resources available and the complexity of the implemented proposals, a complete evaluation of the impact cannot be performed. Despite that, the performance metrics to assess the success of the implementation are defined.

The following subchapters will go deep on the system developed, highlighting the process redesign performed, the tools developed, and the information that was integrated to allow the desired improvements.

6.1 Process Strategy & Roadmap planning

As stated in chapter 4, the major problems impacting this process are related to access to information and alignment between teams. The improvements defined were the following: to redesign the process, to develop a support tool and also to develop a notification system.

The process was redesigned (Appendix G) to become uniform, avoiding the misalignment between teams and at the same time introducing bidirectional flows.

The process already previewed a quarter analysis, but the information itself was not considered for the elaboration of the plan. At the same time, the S&R plan proposal stage did not have in consideration neither the operational information from the team, neither the dependencies needs from other teams, highlighting the misalignment between different teams' roadmaps.

To overcome these problems, a collaborative tool was developed (Appendix H) to access the needs of different teams (*A3*). The process was also redesigned to incorporate new activities (quarterly needs update, quarterly needs review). The "quarterly needs update" activity enables each team to communicate the work that is intended to be performed to other teams, as well as the expected dependencies. The "quarterly needs review" is settled after the reception of other teams' needs, allowing the development of the S&R plan, taking in consideration the other teams' touchpoints. This redesign, integrating different iterations before the construction of the S&R plan, incorporates in the process the bidirectional flows needed (*A1*).

To successfully incorporate the improvements in the new process, the developed tool needs to be updated. To avoid bottlenecks in the process and to guarantee that the different product managers timely update the "quarterly needs" tool, an automatic notification system was developed (*A4*).

This notification system was developed taking advantage of the automation available on the e-goi platform. An autobot (Figure 14) was developed to automatically deploy an e-mail message (Appendix I) reminding the product managers that it is the time to update the file. The rules applied in the construction of the automation guarantee that 15 days before the end of the trimester, the e-mail message is automatically deployed. The autobot is also prepared to address the possibility that some e-mails become lost in the inbox. For that ones, if the e-mail remains to be read, after 7 days a SMS message (Appendix I) is deployed. Finally, the

automation deploys a “thank you” voice message (Appendix I) to the product manager while it notifies the CTO.

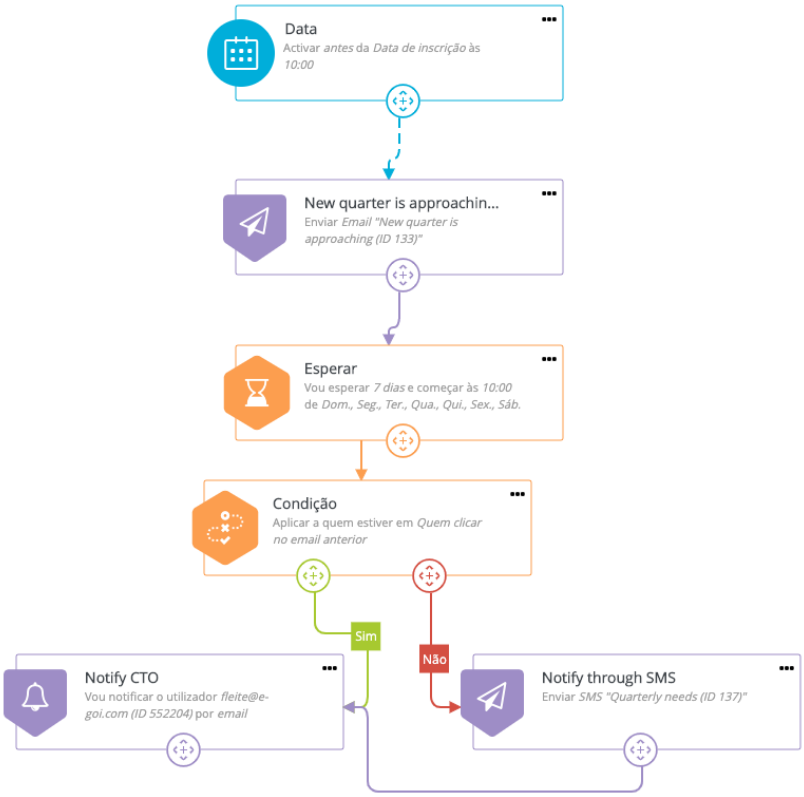


Figure 14 - Quarterly needs autobot

6.2 Process Backlog management

This process has a huge importance for a Product manager. As stated before, this is a backbone process, especially due to the touching points with other processes. To improve this process to achieve efficiency will indirectly improve many other processes.

Currently the process is triggered every time a new Jira issue is added to the backlog. This is mainly to ensure that the backlog is prioritized and estimated.

An important touchpoint of this process is the relation with the different analysis processes. These processes assure that the implemented prioritization model is applied to all analysed issues.

For that reason, if these processes are well applied, all the issues in the backlog are estimated and prioritized. Actually, the major problem in the backlog management process is related to the reassessment of the issues to ensure that the backlog is updated.

The first improvement implemented was the process redesign (A5) and the aim was to guarantee the frequent reassessment of backlog to ensure constant update and to achieve alignment with the planned strategy & roadmap.

This improvement starts with the review of the triggers, phases and activities. The improved process (Appendix J) is triggered every week with the review of the work performed in the

past week and it is also triggered every month to assess if the work performed is aligned with the strategy & roadmap plan.

With this improvement, the trigger “every time a new Jira issue is added to backlog” is eliminated to improve efficiency, eliminate re-work and to uniform the process between teams.

Then, the stages and activities were reorganized to reflect the referred needs. The improved process has now two main stages (backlog grooming and selection for development) where the first stage intends to ensure the frequent reassessment and update of the backlog and the second stage guarantee the update of the backlog with the work planned and not developed and re-selection of new work to be developed.

Finally, in the activities of the process, a step was introduced to analyse the S&R plan and to ensure that the backlog reassessment has in consideration this plan.

To optimize the process, it is not enough to eliminate all the identified problems due to the difficulty manifested in performing the backlog analysis. To help the project managers in this activity. a dashboard was developed and implemented (A6). This dashboard takes advantage of the potentialities of the used platform to manage software development (Jira) through the development of JQL filters (Figure 15) where the information is selected to be presented in visual dashboards.

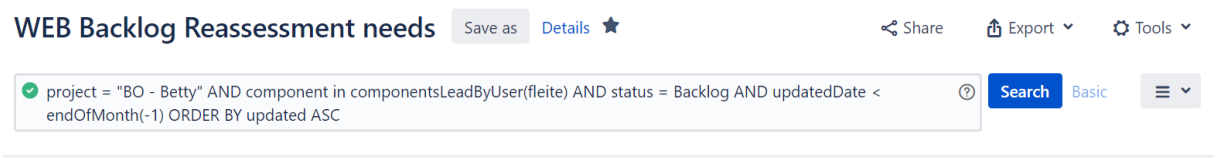


Figure 15 - Example of a JQL filter

This new set of filters and the dashboard (Figure 13) allows the visualization of the backlog organized with the prioritization applied and it also provides a visual identification of the issues that need to be reassessed, by presenting in a dropdown list the collection of issues that were not updated in the past month.

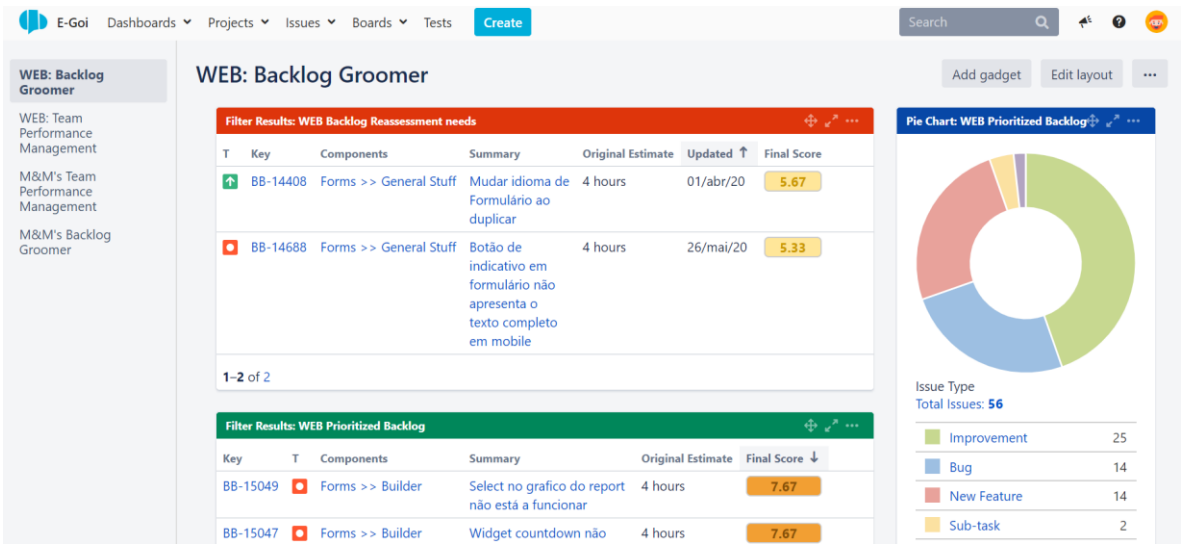


Figure 16 - Backlog groomer dashboard

To monitor the progression of the development, the department uses KANBAN boards where the issues are presented according to the status. This KANBAN board (Figure 17) had no rules for its presentation, having columns of issues scattered around the board.

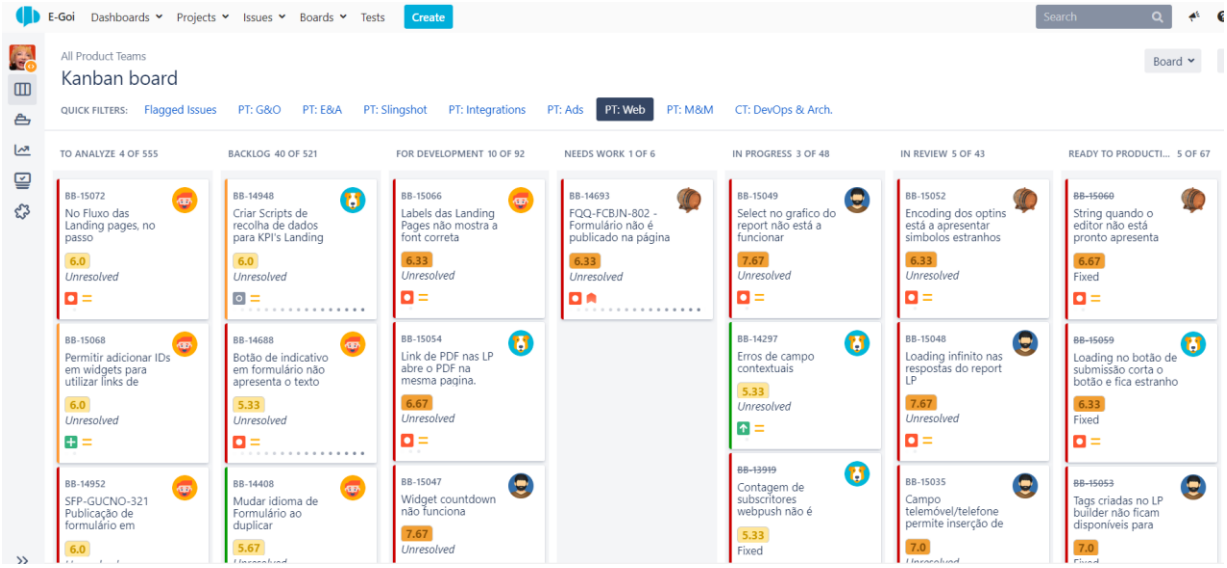


Figure 17 - Existing KANBAN board

In addition to the developed dashboard and taking benefit from the developed filters, a management KANBAN board was also developed and implemented (Figure 18).

This board comprises the three status that are in direct responsibility of the product manager himself and instead of presenting a list of unorganized issues for each status, it presents the issues using the prioritization model applied. This model is based on the MoScoW framework and maps the scoring attributed to the issues with the different status of the framework (must, should, would). The result is also a KANBAN board, but with visual indication of what are the priorities, enabling a faster selection of the issues to be set for development.

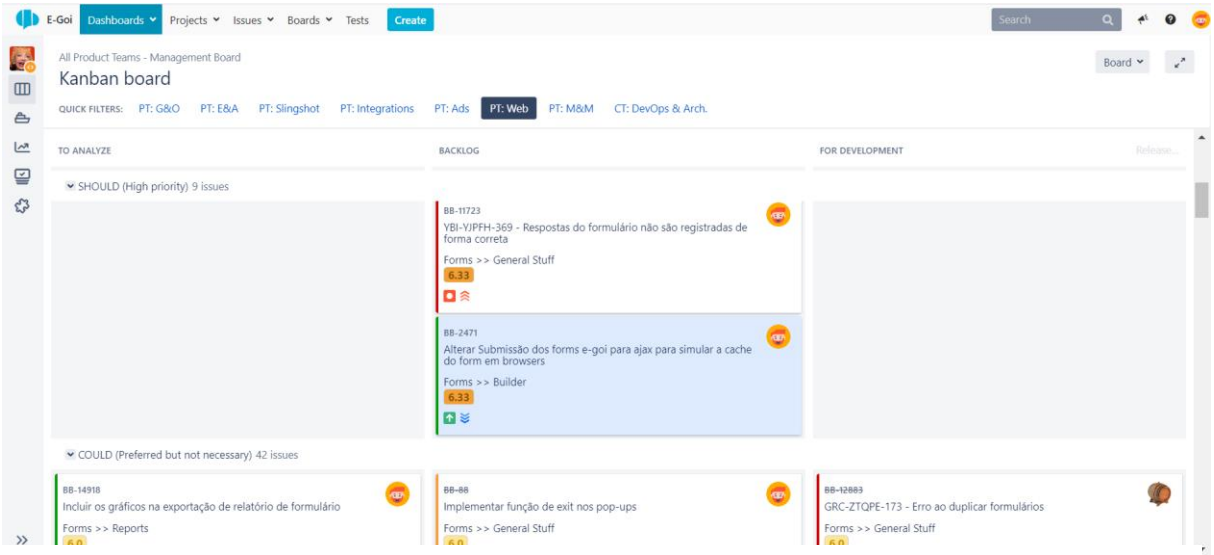


Figure 18 - Implemented Management KANBAN board

6.3 Process Team performance management

As stated in chapter 3, the team performance management is a process that intends to continuously monitor the performance of the different team members while providing feedback. The evaluation model of the company already previewed a combined model where each member is evaluated taking in consideration the team performance, measured with KPI and OKR completion rate, and individual KPI.

The process was not uniformized and for that reason, the different product managers had different approaches to the process implemented where the feedback in some teams was not considered. In processes that involve evaluation, the feedback is important especially if the aim is to improve. Another important idea is that the information that supports feedback should be relevant. When the project started to be implemented, the overall perception was that some phases of the process were identified, but what actually should be developed in each one was not clear. For instance, feedback was made based on perception and not with the support of real data.

To overcome these constraints, the process was redesigned and implemented afterwards (A7). Being a continuous process, in spite of not having triggers, there are differences in application according to the time it is applied. The implemented process (Appendix K) responds to this conviction having three different phases (Daily monitoring, monthly feedback and quarter evaluation). Each phase was divided into two main activities, one related to review/evaluation and other that aims to ensure informed feedback. In this redesign, the kind of information that should be analysed was also defined and used to support feedback, guaranteeing the desired uniformization.

To ensure usability to the redesigned process, it is critical to rapidly have access to updated information. In subchapter 4.3, problems with disperse and unorganized information were presented that led to a consequent lack of key information to provide accurate and informed feedback. To surpass these interrelated problems, a new dashboard was implemented (A8) and also a new tool (A9). The objective of these activity improvements is to increase velocity while reorganizing and presenting the relevant information in the same place. The developed dashboard (figure 19) was settled using JQL filters (figure 15) and presents relevant information related to the team and team members execution performance: mainly the work performed vs the work planned.

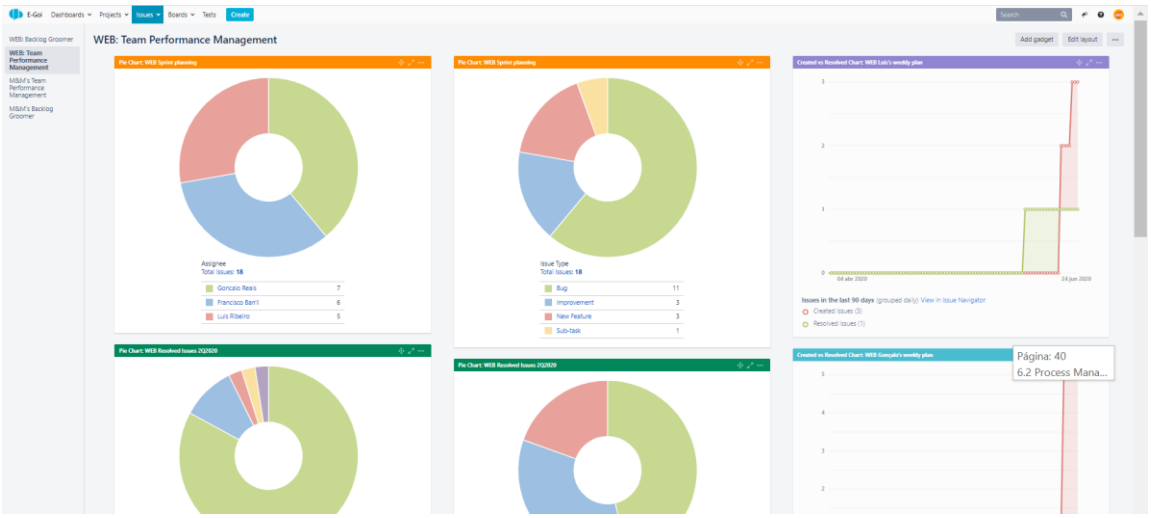


Figure 19 - Team performance management dashboard

The dashboard helps daily monitoring by providing visual meaningful information to present in stand-up feedback meetings. This dashboard also brings value to the monthly feedback and quarter evaluation, providing organized information to be presented in the reports. The implemented monitoring tool (Appendix L) intends to systematize and present all relevant information in the same tool to support mainly the monthly feedback and quarter evaluation. It is integrated with the Jira platform and with the different google sheets used by the department and presents the team KPI and OKR evolution as well as the individual KPI evolution.

6.4 Measuring implementation results

To implement the project, two teams were identified by the company to be used as pilots for the suggested improvement proposals. The two teams are recent teams in the company and both need to be restructured:

- **Web Team**: Formed in October 2019, this team is responsible for an important set of channels of the E-goi platform. The team is responsible for managing and developing Landing pages, pop-ups, embed forms and Webpush. These components were in the responsibility of another product team and were transferred to the new team in the moment of its creation. At the beginning of the project, there was not a dedicated product manager and the team owned a product backlog of 256 issues.
- **Mobile & Messaging Team**: Created in February 2020, it is the most recent team in the department. The team is responsible for managing and developing SMS, SmartSMS, Voice, Push notifications and E-goi Apps (GoiMeUp and TinyGoi). These components were in the responsibility of another product team and were transferred to the new team in the moment of its creation. At the beginning of the project, the team was in the process of creation and got its first developer. The product backlog was composed by 134 issues.

Due to the limited time frame of the project, the implementation phase is ongoing at the time of writing. For that reason, the evaluation of the results is limited. Therefore, this subchapter is dedicated to point out some organizational perceived improvements and to present a proposal of performance metrics to be applied.

A workshop with the involved stakeholders was organized to present the implemented proposals and point out some perceived benefits. In that workshop some practical and visual comparisons between teams were performed.

Regarding the backlog management, the time spent to perform the first update of the product backlog in the two studied teams was evaluated. Team Web was assessed without the support of the developed tools and the team Mobile & Messaging was assessed with the developed tools.

For team Web, this update took 22 days with an average analysis time of 2,06 hours, while for team Mobile & Messaging, it took 6 days with an average analysis time of 1,07 hours.

Other success indicator that was presented was the update coverage between the two teams. For that, in the end of this analysis, the developed filter was applied to select the issues that need to be reassessed. The results showed that in team WEB there were 9 issues that were not

updated, with a coverage of 96,5%, while in team Mobile & Messaging there was 100% coverage with 0 issues without update.

To highlight the benefits of the implemented improvements in Team performance management, the different product managers were asked to present the results of the team KPI/OKR and the team members KPI while the response time was timed.

The average response time was 7,22 minutes with a maximum of 11,39 minutes and a minimum of 1,25 minutes (Web team).

If the two studied teams were removed from the pool, the average response time would increase to 9,59 minutes as the average response time of the two teams was 1,30 minutes.

For the Strategy & Roadmap plan it was not possible to present any numeric and comparable result, but taking in consideration the expected impact, it was decided to roll out and implement the developed tool and improved process in all the seven product teams already in the 2020 third quarter preparation.

In the following months, the developed proposals will continue to be tested in the selected teams. Given the extent of changes implemented, high changes in the team's business performance are expected, as well as in the quality of service deployed, efficiency and speed of development.

To guide the establishment of performance metrics, the Balanced Scorecard, proposed by Kaplan & Norton in 1992, was used as performance measurement tool

The Balanced Scorecard materializes the company's vision and strategy through a map with objectives and performance indicators, organized according to four different perspectives: financial, customers, internal processes and learning and growth (Santos, 2006).

As stated by Kaplan & Norton (1996), these indicators must be interconnected to communicate a small number of broad strategic themes, such as the company's growth, the reduction of risks or the increase in productivity.

The name reflects the balance established between short and long-term objectives, financial and non-financial indicators, lagging indicators and leading indicators and between internal and external performance (Santos, 2006). Its completeness enables the company top management to have a complete visualization of the business based in the four main perspectives: financial, customer, innovation and learning and internal (Van Looy & Shafagatova, 2016).

Table 10 presents the performance metrics defined for each perspective.

Table 10 - Performance metrics

Perspective	Performance Metrics
Financial	- Total service costs; - Number of active paying customers; - Channel sales;

Perspective	Performance Metrics
Customer	- Customer satisfaction; - Support tickets; - Number of monthly active customers; - Number of contracted new businesses;
Internal	- Quality of the service provided; - Reliability of business processes; - Process lead time; - Product managers' productivity;
Innovation and Learning	Number of new products/services; - Number of product/service improvements; - Level of internal satisfaction with the developed system.

7 Main Conclusions and Future Research Directions

This project was grounded in a research analysis of product management processes. The analysis consisted mainly in identifying improvement opportunities, developing and implementing solutions to address the problems identified, ensuring the adaptation to the business reality in which it operates. The product management processes were selected to be targeted considering the importance of the process and the maturity of the implementation.

This final chapter is dedicated to the presentation of the main conclusions achieved during the course of the project, consequently demonstrating the accomplishment of the research objectives outlined in the first chapter. In the end, future improvement developments that can drive new research processes are presented.

7.1 Main Conclusions

The research objectives defined in the beginning of the project were achieved and it was possible to present an outcome for all the research questions initially defined.

In the beginning phase of this project, the focus was in exploring the company and its development department's functioning in order to determine how processes are currently handled. It was verified that E-goi had achieved significant business growth allied to a radical change in the organizational structure of the product development department.

Being a SaaS company, concepts as time to market have an enormous impact, and for that reason the department needs to deliver innovative products within a fast-paced development rhythm. The organizational restructure was focused in achieving a more agile environment for development through the creation of product teams. As stated before, this major change was implemented without a previous study on this topic nor the adoption of an adequate plan. Despite this lack of previous study, the department was organized in a model similar to the "Spotify engineering model" where teams are self-organized and have full autonomy on the general strategy for the product, achieving high levels of velocity as well as the reducing the decision chains (Kniberg, 2014).

One of the first achievements was framing the development model implemented to launch the definition of the process map. The aim of the department was to implement a leaner and constantly optimized development process. Taking into consideration the principles of the Agile methodologies explored, it was possible to identify similarities in the implemented model and SCRUMBAN framework. By following a qualitative research approach, the conduction of informal interviews, direct observation, document analysis and automated discovery, it was possible to identify a possible draft of a process map to be validated. The conduction of a set of workshops enabled the definition of the product management process map, enabling the identification of improvement opportunities, namely the root causes of the problems, thus answering RQ1 and RQ2.

The major problems identified in the selected processes were related to three main dimensions: Processes non-uniformization; Unorganized and dispersed information; Misalignments. In fact, the identified processes present different interpretations due to the lack of uniformization. Allied to that, the department uses a set of different and unintegrated tools to support the daily work, restricting the fast access to key information and resulting in misalignment between processes and between teams.

After identifying and characterizing improvement opportunities, the project focused on the formulation and prioritization of possible solutions to correct or mitigate the problems identified through the conduction of additional workshops with product managers, thus answering RQ3 and RQ4. To prioritize the improvement solutions to implement, a cost-benefit analysis of the proposed solutions was developed. This analysis had in consideration the expected improvement effects as well as the difficulty of implementation, especially in terms of required time of implementation, associated cost and level of collaborative effort needed.

It was possible to implement 66% of the identified solutions, corresponding to the globality of the solutions identified in the analysis in the quadrant "implement". These implemented solutions enable a more efficient achievement of the processes goals while eliminating the misalignment between processes and different teams. The developed tools and automations enable an easy and quicker access to key information that can support informed decisions.

Despite the initiation of the implementation stage, it is still not possible to conclude on the success of this last phase of the project, since the process has not had enough time to produce significant results. Some preliminary results can be identified mostly related to the efficacy and efficiency of the redesigned processes. Due to the nature and expected impact of the solution, the Balanced Scorecard was the performance measurement tool used to formulate performance criteria to be used to access the final success of these implementation proposals.

The involvement of all stakeholders in this project was crucial for an in-depth qualitative investigation, generation of improvement actions and implementation of the selected solutions.

In conclusion, this dissertation grounds a continuous improvement approach that can drive future research and launch change projects in the department and company.

7.2 Future Research Directions

Taking into consideration the short period in which the project was developed and the internal resources available, not all the product management processes were assessed nor all of the proposed improvement solutions have been implemented.

Nevertheless, the research carried out throughout this project can serve as a basis for future internal projects, to further increase the efficiency, effectiveness and productivity of the product management teams. On the other hand, some of the proposed solutions developed were framed considering a long-term perspective, requiring at the time of writing more time to start producing significant results.

For this reason, the results regarding the success of the implementation phase have not yet been collected. In this sense, future research directions can focus on understanding the results achieved and, if necessary, serve as foundations for new business process improvement projects. In addition, and after proving the success of the applied methodology, the same can be replicated for processes that have not yet been the target of intervention.

Due to the absence of a previous study on this topic, this project provided the company and the department with a significant set of knowledge and documentation that must be preserved to support future research. Likewise, the establishment of an internal BPM group to promote,

manage and prioritize business process improvement projects can help the company and the department to maintain the process-oriented culture that started with this project.

For the success of the proposed solutions, it is critical that the participants can have access to adequate training. The intended success can only be achieved if product managers are able to understand and accept the changes that are being implemented. Then, they shall have the opportunity to actively participate on the model improvement by suggesting viable alternatives. For this reason, training should be provided, focusing on continuous and systematic learning experiences, and not just through a series of workshops as the ones held at the beginning of the project.

Finally, it is important to highlight that this dissertation followed a qualitative research approach mostly due to the lack of data, which limited the quantification of causes. Therefore, future research directions include the development of a project with the objective of enriching and complementing the presented analysis using a quantitative research approach. A model could then be developed, launched and applied in other companies in the same business area.

References

Abrahamsson, P., Salo, O., Ronkainen, J. and Warsta, J. (2002). *Agile Software Development Methods: Review and Analysis*. Proc. Espoo, 3-107.

Aigrain, P. (2013). *The Individual and the Collective in Open Information Communities.* extended abstract of an invited talk at the 16th BLED Electronic Commerce Conference. Retrieved from: http://eprints.rclis.org/29545/.

Albarqi, A. and Qureshi, R. (2018). *The Proposed L-Scrumban Methodology to Improve the Efficiency of Agile Software Development.* Information Engineering and Electronic Business, 3, 23-35.

Almeida, F. (2017). *Challenges in migration from waterfall to agile environments.* World Journal of Computer Application and Technology, 5(3), 39-49.

Andersen, B. (2007). *Business Process Improvement Toolbox.* ASQ Quality Press.

Anderson, D. (2003). *Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results.* Upper Saddle River, New Jersey.

Anderson, D. and Dumitriu, D. (2015). *From Worst to Best in 9 Months: Implementing a Drum-Buffer-Rope Solution in Microsoft's IT Department*. Proceedings of the TOCICO World Conference, Barcelona.

Association of Business Process Management Professionals (2013). *BPM CBOK.* ABPMP São Paulo.

Azevedo, A., and Faria, J. (2018). *BPM Notes*. FEUP.

Banfield, R., Eriksson, M. and Walkingshaw, N. (2017). *Product Leadership: How Top Product Managers Launch Awesome Products and Build Successful Teams*. O'Really, Boston.

Beck, K. (1999). *Embracing change with extreme programming.* Computer, 32(10), 70-77.

Beck, K., Fraser, S., Caputo, B., Mackinnon, T., Newkirk, J., and Poole, C. (2003). *Test driven development (TDD).* In International Conference on Extreme Programming and Agile Processes in Software Engineering. Springer, Berlin, Heidelberg, 459-462.

Bhuvaneswari, T. and Prabaharan, S. (2013). *A Survey on Software Development Life Cycle Models*.

Cagan, M. (2017). *Inspired – How to create tech products customers love*. John Wilwy & Sons Inc. (11ed.)

Corona, E. and Pani, F. (2013). *A Review of Lean-Kanban Approaches in the Software Development*. WSEAS Transactions on Information Science and Applications, 1 (10), 1-13

Cusick, J. (2013). *Durable Ideas in Software Engineering: Concepts, Methods and Approaches from my Virtual Toolbox*. Bentham books, New York.

Delacroix, J. (2005). *Les wikis, espaces de l'intelligence collective.* M2 Editions, Paris.

Dima, A. and Maassen, M. (2018). *From Waterfall to Agile software: Development models in the IT sector, 2006 to 2018 - Impacts on company management.* Journal of International Studies, 11, 315-326.

Dumas, M., La Rosa, M., Mendling, J., and Reijers, H. (2018). *Fundamentals of Business Process Management (2 ed.)*. Springer-Verlag Berlin, Heidelberg.

Fortin, M., (2003). *O Processo de investigação: da concepção à realização (3 ed.).* Lusociência, Loures.

Govardhan, A. (2010). *A Comparison Between Five Models of Software Engineering.* IJCSI International Journal of Computer Science Issues, 1694-0814 (7), 94-101.

Grech, T. (2015). *The intersection of agile and waterfall.* Industrial Engineering, 47-49.

Harmon, P. (2007). *Business Process Change: A Guide for Business Managers and BPM and Six Sigma Professionals.* Elsevier/Morgan Kaufmann Publishers.

Jacka, J., and Keller, P. (2009). *Business Process Mapping: Improving Customer Satisfaction.* Wiley.

Johnson, G., Scholes, K., and Whittington, R. (2008). *Exploring Corporate Strategy.* Financial Times Prentice Hall.

Kaplan, R. and Norton, D. (1992). *The Balanced Scorecard – Measures that Driver Performance.* Harvard Business Review.

Kaplan, R. and Norton, D. (1996). *Using the Balanced Scorecard as a Strategic Management System.* Harvard Business Review.

Kniberg, H. (2014). *Spotify engineering culture*. Retrieved from: https://engineering.atspotify.com/2014/03/27/spotify-engineering-culture-part-1/.

Kruchten, P. (2000). *The Rational Unified Process: an Introduction*. Addison-Wesley.

Ladas, C. (2008). *Scrumban: Modus Cooperandi*. Press Seattle.

Lapunka, I., Jagoda, D. and Marek-Kolodziej, K. (2017). *Innovation project machine in a systems approach to engineering management.* CBU International Conference Proceedings.

Lindstrom, L. and Jeffries, R. (2004). *Extreme Programming and Agile Software Development Methodologies.* IS Management, 21, 41-52.

Linz, T. (2014). *Testing in Scrum: A Guide for Software Quality Assurance in the Agile World.* Rocky Nook, California.

Mahadevan, L., Kettinger, W., and Meservy, T. (2015). *Running on Hybrid: Control Changes when Introducing an Agile Methodology in a Traditional "Waterfall" System Development Environment*. Communications of the Association for Information Systems.

Mahnic, V. (2014). *Improving Software Development through Combination of Scrum and Kanban.* Recent Advances in Computer Engineering, Communications and Information Technology, 281-288.

Morgan, J. (2018). *Applying 1970 Waterfall Lessons Learned Within Today's Agile Development Process*. PM World Journal 7 (7).

Ordysinski, T. (2013). *Kanban based information management in organization*. Studies & Proceedings Polish Association for Knowledge Management, 63, 76-85.

Osterwalder, A., and Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers.* John Wiley & Sons.

Pells, D. (2017). *Devil's Advocate: Agile from a Distance*. Issue IV.

Poppendieck M., and Poppendieck T. (2003). *Lean software development: An agile toolkit*. Addison Wesley Boston.

Porter, M. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance.* Free Press.

Ramias, A., and Wilkins, C. (2010a). *Building Metrics for a Process*. Retrieved from BP Trends website: https://www.bptrends.com/bpt/wp-content/publicationfiles/SEVEN%20-COL-Performance%20Improvement-Building%20Metrics%20for%20a%20Process%20-Ramias-Wilkins-v2-final.pdf.

Ramias, A., and Wilkins, C. (2010b). *Measuring Process Performance.* Retrieved from BP Trends website: https://www.bptrends.com/bpt/wp-content/publicationfiles/ONE-05-10-COL-Performance%20Improvement-%20Measuring%20Process%20Performance%20-Ramias-Wilkins%20v31.pdf.

Santos, R. (2006). *Balanced Scorecard em Portugal: visão, estratégia e entusiasmo*. GestãoPlus, Cascais.

Sarker, I., Faruque, F., Hossen, U. and Rahman, A. (2015). *A Survey of Software Development Process Models in Software Engineering.* International Journal of Software Engineering and its Applications, 9 (11), 55-70.

Sauro, J. (2015). *5 Types of Qualitative Methods - Measuring U*. Retrieved from: https://measuringu.com/qual-methods.

Schwaber, K. (1997) *SCRUM Development Process in: Business Object Design and Implementation.* Springer, London, 1-23.

Schwaber, K. and Beedle, M. (2002). *Agile Software Development with Scrum*. Prentice Hall, New jersey.

Sharp, A., and McDermott, P. (2009). *Workflow Modeling: Tools for Process Improvement and Applications Development.* Artech House.

Sly, D. (2018). *Internet eKANBAN/eKitting Involving Suppliers*. Procedia manufacturing, 17, 484-490.

Stoica, M., Ghilic-Micu, B., Mircea, M. and Uscatu, C. (2016). *Analyzing Agile Development – from Waterfall Style to Scrumban.* Informatica Economica 20 (4), 5-14.

Sverrisdottir, H., Ingason, H., and Jonasson, H. (2014). *The role of the Product Owner in Scrum - comparison between theory and practices*. Procedia-Social and Behavioral Sciences, 119, 257-267.

Takeuchi, H. and Nonaka, I. (1986). *The new new product development game*. Harvard Business Review.

Trends, B. (2013a). *Business Process*. Retrieved from https://www.bptrends.com/resources/glossary/business-process/.

Trends, B. (2013b). *Business Process Management (BPM).* Retrieved from https://www.bptrends.com/resources/glossary/business-process-management-bpm/.

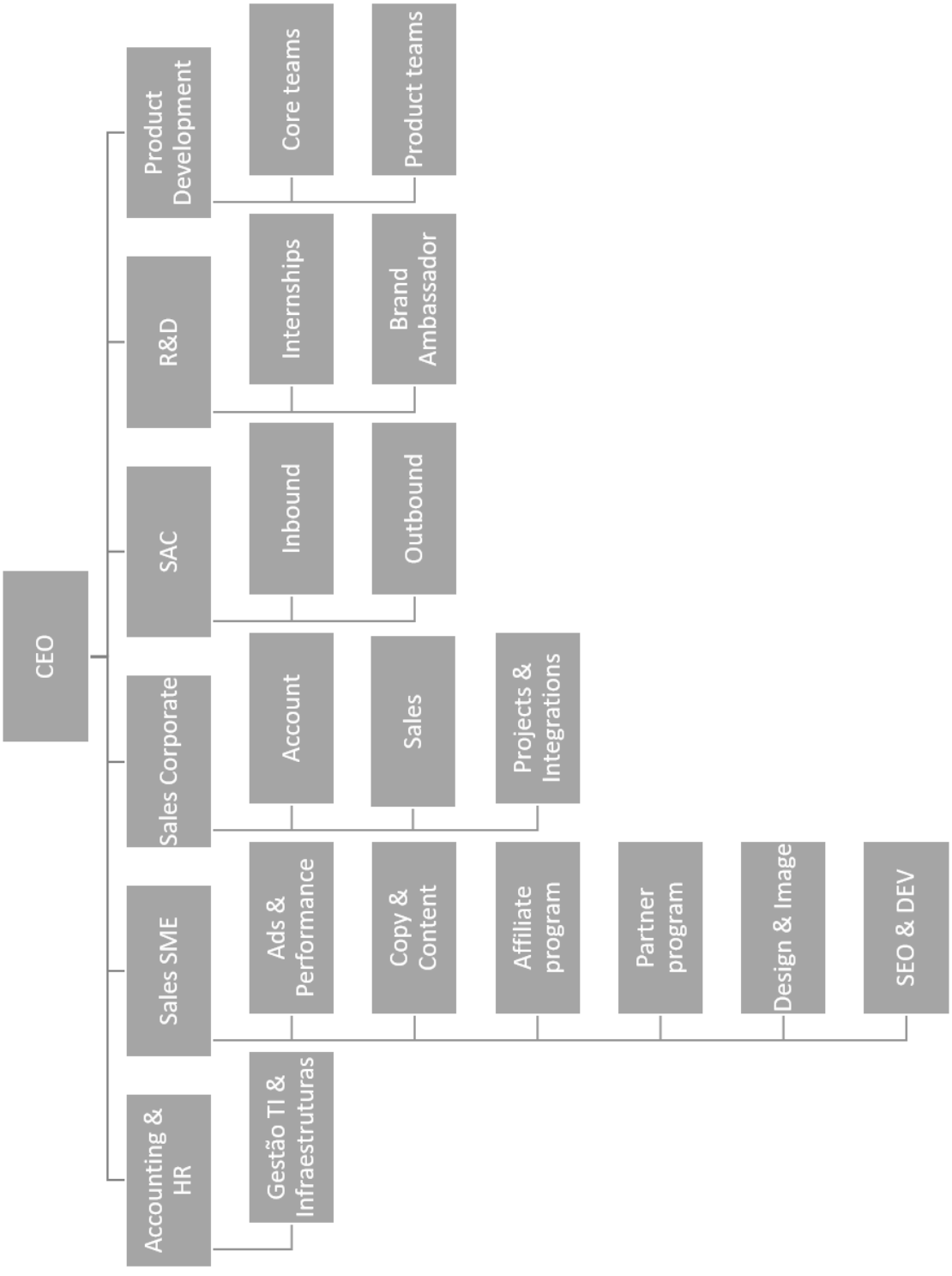
Ungan, M. (2006). *Towards a better understanding of process documentation*. The TQM Magazine, 18 (4), 400-409.

University of Pretoria, (n.d.). *Chapter 5: Defining the Problem and Development of Propositions*. Retrieved from

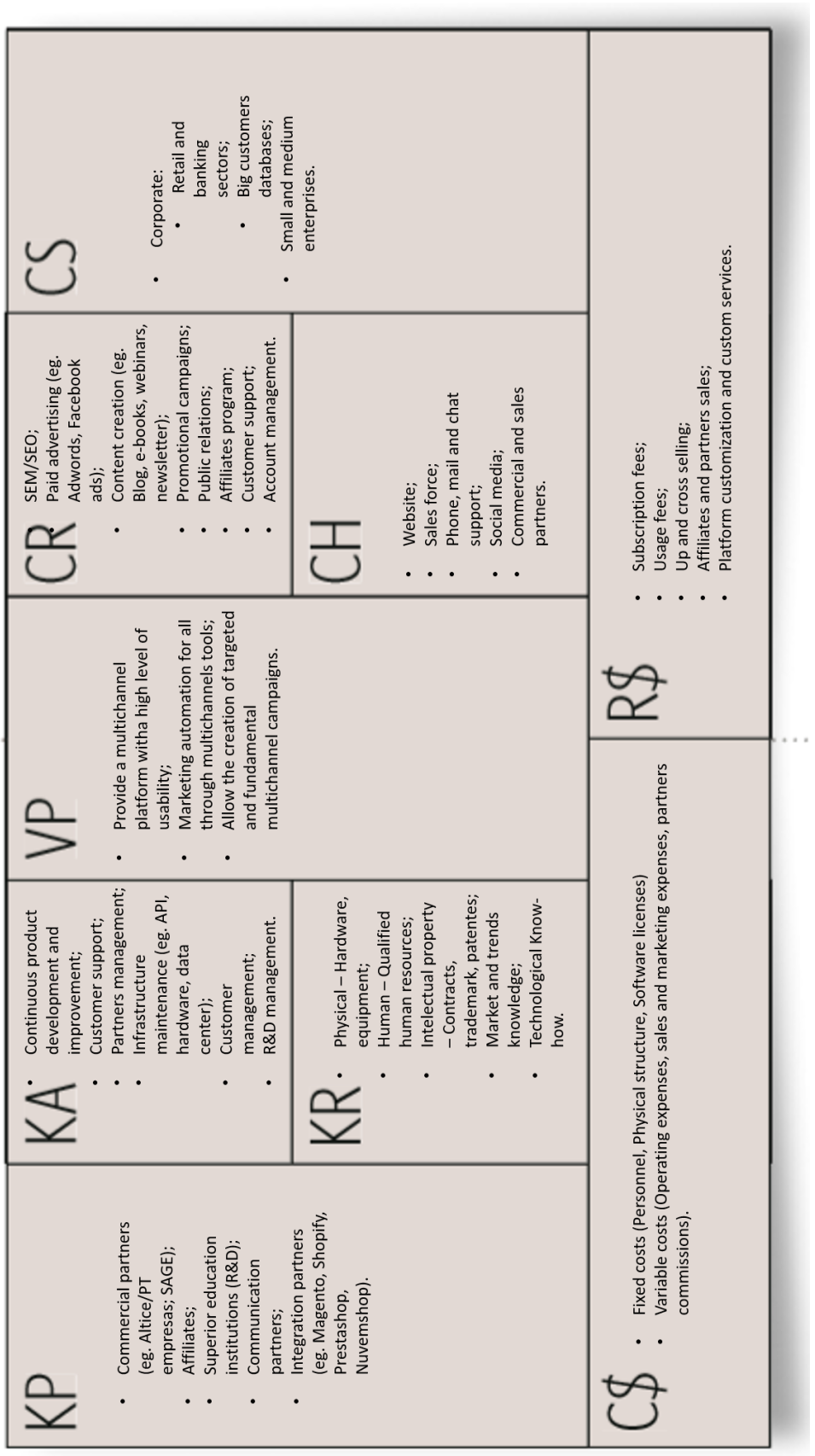
Van Looy, A., and Shafagatova, A. (2016). *Business process performance measurement: a structured literature review of indicators, measures and metrics (Vol. 5*).

Yuonan, J. and Mamedov, R. (2020). *Agile Project Management in Banking - A study of how agile methods are modified to suit the context of a bank.* Master thesis presented to Södertörn University - School of Social Sciences, Stockholm

APPENDIX A: Company Organigram



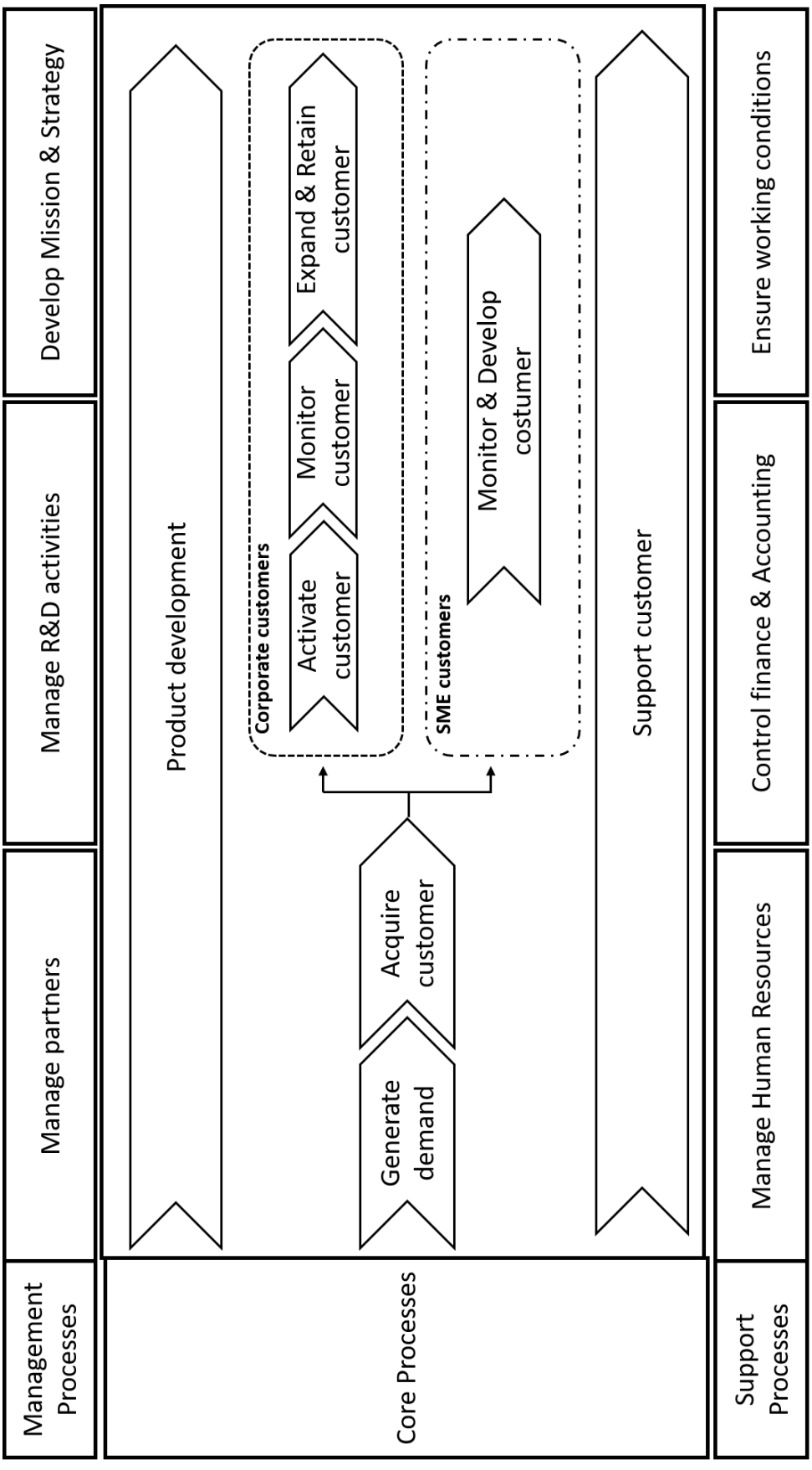
APPENDIX B: Business Model Canvas



APPENDIX C: SWOT Analysis

Strengths	Weaknesses
• Multichannel integration; • Competitive price; • High level of commercial and technical support; • High satisfaction and proximity to customers; • Technological skills and market knowledge; • Flexibility and adaptability of the product (different markets).	• Lack of business process documentation; • Lack of international office presence; • Low presence in foreign markets; • Reduced dimension compared to competitors.
Opportunities	**Threats**
• Demand of SaaS solutions is increasing; • Urgent need of digital transformation; • Advertising changing from traditional to digital; • Possible expansion for new markets; • Potential to develop new strategic partnerships; • R&D culture and partnership with universities.	• Customers demand for new technologies such as AI and deep learning; • Domestic market is limited and can saturate; • Currency fluctuation in important markets (LATAM); • Lack of high specialized human resources in the north of country.

APPENDIX D: Company Process Architecture



APPENDIX E: Process Fact Sheets

Process Fact sheet				
Process name	Bug Analysis			
Purpose	Analyze and identify the behavior of the reported bug. Identify possible intervention.			
Application scope	Every open Bug issue			
Trigger	New Jira issue with type bug and team component			
Inputs	Information documented in Jira issue, Print screens/Record screens, helpdesk tickets			
Result	Full comprehension of referred problem. Progression in issue lifecycle (Backlog/Selected for development)			
Outputs	Bug priority scoring, Analysis report			
Phases	Bug exploration	Score & estimation	Progression decision	
Main responsible	Product Manager	Product Manager	Product Manager	

Interactions	Process	Data or materials	Input or Output
	Support customer	Issue Info	Input
	Monitor customer	Issue Info	Input
	Backlog Management	Analysis report & Score	Output
	Operational Planning	Analysis report & Score	Output

Author		Date		Version	

Process Fact sheet				
Process name	Improvement Analysis			
Purpose	Analyze the suggestion and impact in the functionality. Analyze the tradeoff between UX improvement and development effort			
Application scope	Every open Improvement issue			
Trigger	New Jira issue with type improvement and team component			
Inputs	Information documented in Jira issue, Print screens/Record screens, helpdesk tickets			
Result	Full comprehension of the suggestion and development impact. Progression in issue lifecycle (Backlog/Selected for development)			
Outputs	Issue priority scoring, Analysis report			
Phases	Improvement exploration	Score & estimation	Progression decision	
Main responsible	Product Manager	Product Manager	Product Manager	

Interactions	Process	Data or materials	Input or Output
	Support customer	Issue Info	Input
	Monitor customer	Issue Info	Input
	Backlog Management	Analysis report & Score	Output
	Operational Planning	Analysis report & Score	Output
	UX/UI design	Analysis report & Score	Output

Author | Date | Version

Process Fact sheet	
Process name	Feature Analysis
Purpose	Analyze the suggestion. Analyze the development effort and inclusion in roadmap.
Application scope	Every open New feature issue
Trigger	New Jira issue with type New feature and team component
Inputs	Information documented in Jira issue, Product research report
Result	Full comprehension of the suggestion. Progression in issue lifecycle (Backlog/Selected for development)
Outputs	Issue priority scoring, Analysis report

Phases	Improvement exploration	Score & estimatation	Progression decision	
Main responsible	Product Manager	Product Manager	Product Manager	

Interactions

Process	Data or materials	Input or Output
Support customer	Issue Info	Input
Monitor customer	Issue Info	Input
Backlog Management	Analysis report & Score	Output
Operational Planning	Analysis report & Score	Output
UX/UI design	Analysis report & Score	Output

Author | Date | Version

Process Fact sheet	
Process name	Backlog Management
Purpose	Ensure the effective development of the different issues according to prioritization, estimation and strategy & roadmap plan.
Application scope	Regular update and review before weekly planning
Trigger	New issues in backlog/Monthly planning
Inputs	New issues, Strategy & Roadmap plan
Result	Updated backlog according to prioritization and estimation
Outputs	Set of issues selected for development; Backlog prioritized list

Phases	Backlog grooming	Issue reassessment	Selection for development	
Main responsible	Product Manager	Product Manager	Product Manager	

Interactions

Process	Data or materials	Input or Output
B/I/NF Analysis	Issue Info	Input
Operational Planning	Selected issues	Output
Product development	Selected issues	Output

Author		Date		Version	

Process Fact sheet			
Process name	Operational planning		
Purpose	Distribute the selected issues for the different team workers		
Application scope	Every weekly planning		
Trigger	Weekly planning meeting		
Inputs	Selected issues for development; Strategy & Roadmap plan		
Result	Team members workload selection and week plan		
Outputs	List of issues to develop		
Phases	Selected Issues review	Team members distribution	Monitor plan accomplishment
Main responsible	PM/Lead DEV	Lead DEV	PM/Lead DEV

Interactions	Process	Data or materials	Input or Output
	Backlog Management	Selected issues	Input
	Strategy & Roadmap planning	Quarter OKR & S&R plan	Input
	Team performance management	Plan accomplishment	Output
	Product development	Selected issues	Output
	Product development monitoring	Selected issues	Output

Author		Date		Version	

Process Fact sheet				
Process name	Acceptance testing			
Purpose	Ensure that the development complies with the requirements			
Application scope	Every solved issue and before QA Review			
Trigger	Dev team communication			
Inputs	Information documented in Jira issue			
Result	Issue ready to be tested. Progression in issue lifecycle (In Review)			
Outputs	Issue in Review			
Phases	Issue testing	Progression decision		
Main responsible	Product manager	Product Manager		

Interactions	Process	Data or materials	Input or Output
	Backlog Management	Selected issues	Input
	Strategy & Roadmap planning	Quarter OKR & S&R plan	Input
	Team performance management	Plan accomplishment	Output
	Product development	Selected issues	Output
	Product development monitoring	Selected issues	Output

Author | Date | Version

Process Fact sheet				
Process name	Release planning			
Purpose	Ensure the strategic deploy of issues			
Application scope	Every issue in Ready to production			
Trigger	Change in status to Ready to production			
Inputs	Selected issues Ready to production; Strategy & Roadmap plan			
Result	Issue in production			
Outputs	Issue in production			
Phases	Issue vs S&R plan analysis	Progression decision		
Main responsible	Product manager	Product Manager		

Interactions	**Process**	**Data or materials**	**Input or Output**
	Strategy & Roadmap planning	Quarter OKR & S&R plan	Input
	Product development	Developed issue	Input
	Deploy	Developed issue	Output

Author		Date		Version	

Process Fact sheet				
Process name	Product research			
Purpose	Keep updated with the market. Ensure product innovation and competitive advantage			
Application scope	Continuous			
Trigger	N/A			
Inputs	Market reports, Product analysis reports, Competitors feature documentation, Corporate reported needs, SME reported needs, S&R plan			
Result	Full comprehension of the market trends. Product updated with market, Product with competitive advantage			
Outputs	New Feature issues, New improvement issues			
Phases	Market exploration	Competitors analysis	Feature/improvement proposal	
Main responsible	Product Manager	Product Manager	Product Manager	

Interactions	Process	Data or materials	Input or Output
	Support customer	Feature needs	Input
	Monitor customer	Feature needs	Input
	Manage R&D activities	R&D report	Input
	Feature analysis	Issue info	Output
	Improvement analysis	Issue info	Output

Author		Date		Version	

Process Fact sheet	
Process name	Strategy & Roadmap planning
Purpose	Define the strategy & Roadmap for the team
Aplication scope	Every quarter
Trigger	Quarter plan meeting
Inputs	Company strategy report, Corporate reported needs, SME reported needs, S&R plan (previous quarter)
Result	Strategy & Roadmap plan for the quarter
Outputs	S&R plan, OKR

Phases	Quarter analysis	S&R plan proposal	S&R plan feedback	S&R plan validation
Main responsible	Product Manager	Product Manager	CTO	CEO

Interactions

Process	Data or materials	Input or Output
Support customer	Feature needs	Input
Monitor customer	Feature needs	Input
Develop mission & strategy	Company strategy report	Input
Feature analysis	Issue info	Output
Improvement analysis	Issue info	Output

Author | Date | Version

Process Fact sheet				
Process name	Product development monitoring			
Purpose	Monitor the development process			
Application scope	Continuous			
Trigger	N/A			
Inputs	List of issues to develop, Issues in development			
Result	Development process complies with planning			
Outputs	Issues ready to be accepted			
Phases	Continuous monitoring			
Main responsible	Product manager			

Interactions	Process	Data or materials	Input or Output
	Operational planning	Selected issues	Input
	Product development	Developed issue	Input
	Acceptance testing	Developed issue	Output

Author | Date | Version

Process Fact sheet				
Process name	Team performance management			
Purpose	Manage the performance and career progression of team			
Application scope	Continuous			
Trigger	N/A			
Inputs	Carreer plan, Evaluation reports			
Result	Team complies with carreer objetectives			
Outputs	Evaluation report			
Phases	Daily monitoring	Monthly feedback	Quarter evaluation	
Main responsible	Product Manager	Product Manager	Product Manager	

Interactions	Process	Data or materials	Input or Output
	Manage human resources	Career plan, Evaluation reports	Input/output
	Product development monitoring	KPI and OKR monitoring	Input
	Strategy & Roadmap planning		Input

Author		Date		Version	

Process Fact sheet				
Process name	Knowledge management			
Purpose	Ensure Know how transfer and proper product documentation			
Application scope	Continuous			
Trigger	N/A			
Inputs	Development standards, Feature documentation, Knowledge base articles, External communication materials			
Result	Product information updated, KhT accomplished			
Outputs	Feature documentation			
Phases	Feature documentation	KB review	Update documentation	Update KB
Main responsible	DEV Team	Product Manager	DEV Team	Product Manager

Interactions	Process	Data or materials	Input or Output
	Product development	Issue information	Input
	Knowledge base management	Feature documentation	Output

Author | Date | Version

Process Fact sheet				
Process name	Manage human resources			
Purpose	Ensure the human resources needs of team			
Application scope	Continuous			
Trigger	N/A			
Inputs	New team member, team member exit, new team member need			
Result	Ensure the human resources needs of team			
Outputs	Team complete			
Phases	Team member requirements communication	Onboarding	Team member exit communication	KhT
Main responsible	PM	PM/LD	PM	PM/LD

Interactions	Process	Data or materials	Input or Output
	Manage human resources (company level)	Requirements communication/exit communication	Input/output
	Knowledge management		Output
	Operational planning		Output

Author		Date		Version	

Process Fact sheet				
Process name	Manage support tools			
Purpose	Ensure that the team has the proper support tools			
Application scope	Continuous			
Trigger	N/A			
Inputs	Tool need communication			
Result	Team with propper support tools			
Outputs	Tool request			
Phases	Manage tools	Evaluate tool need	Tool request	
Main responsible	Product manager	PM/LD	Product manager	

Interactions	Process	Data or materials	Input or Output
	Product development	Tool need communication	Input
	Ensure working conditions	Tool request	Output

Author		Date		Version	

Process Fact sheet				
Process name	Ensure culture alignment			
Purpose	Ensure team/department/company culture alignment			
Application scope	Continuous			
Trigger	N/A			
Inputs	Company mission, Company strategy report, Development standards			
Result	Team/department/company culture fit			
Outputs	N/A			
Phases	Advocate culture			
Main responsible	PM			

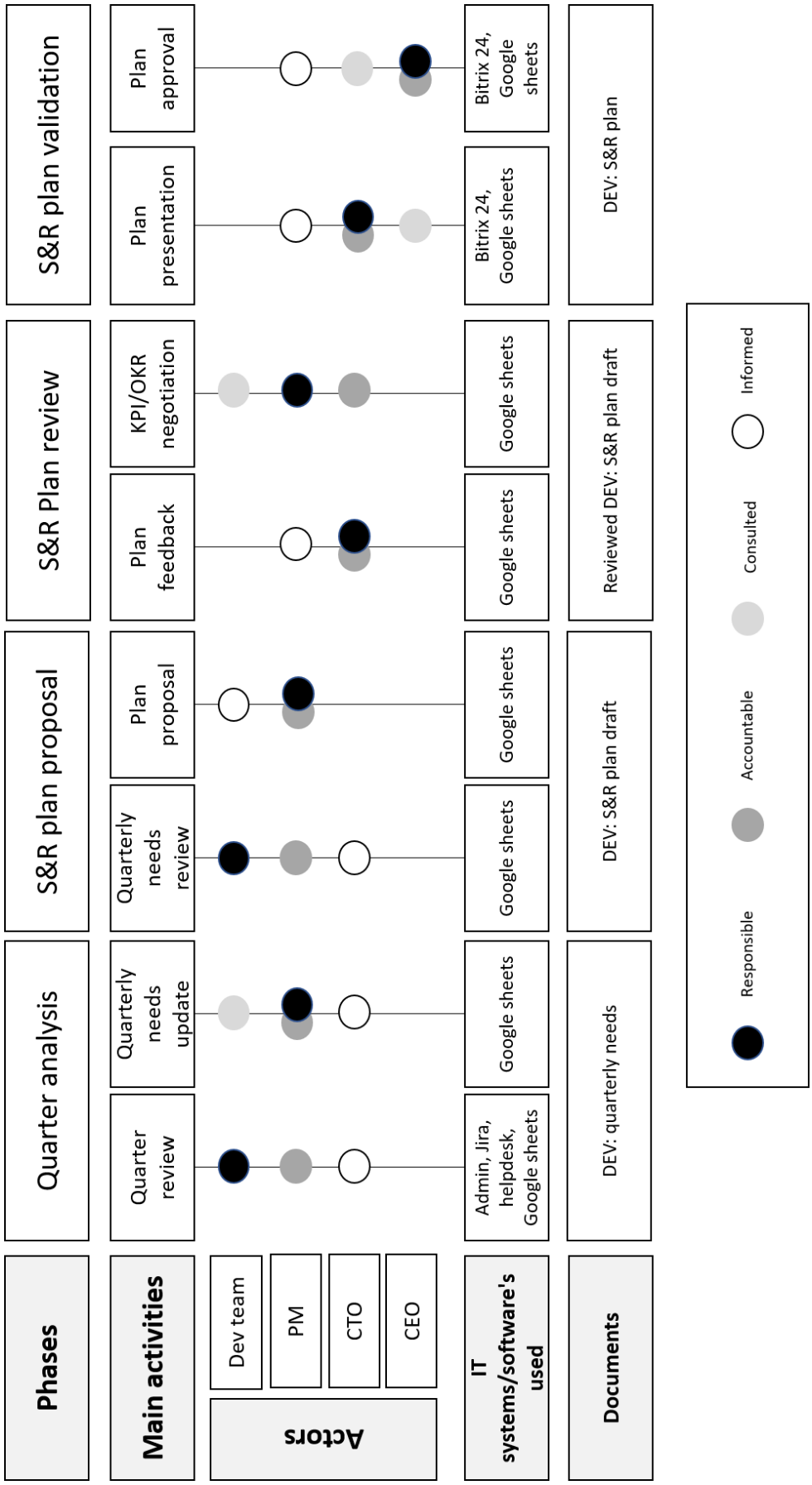
Interactions	Process	Data or materials	Input or Output
	Develop mission & strategy	Company mission, Company strategy report	Input
	Product development	Development standards	Input

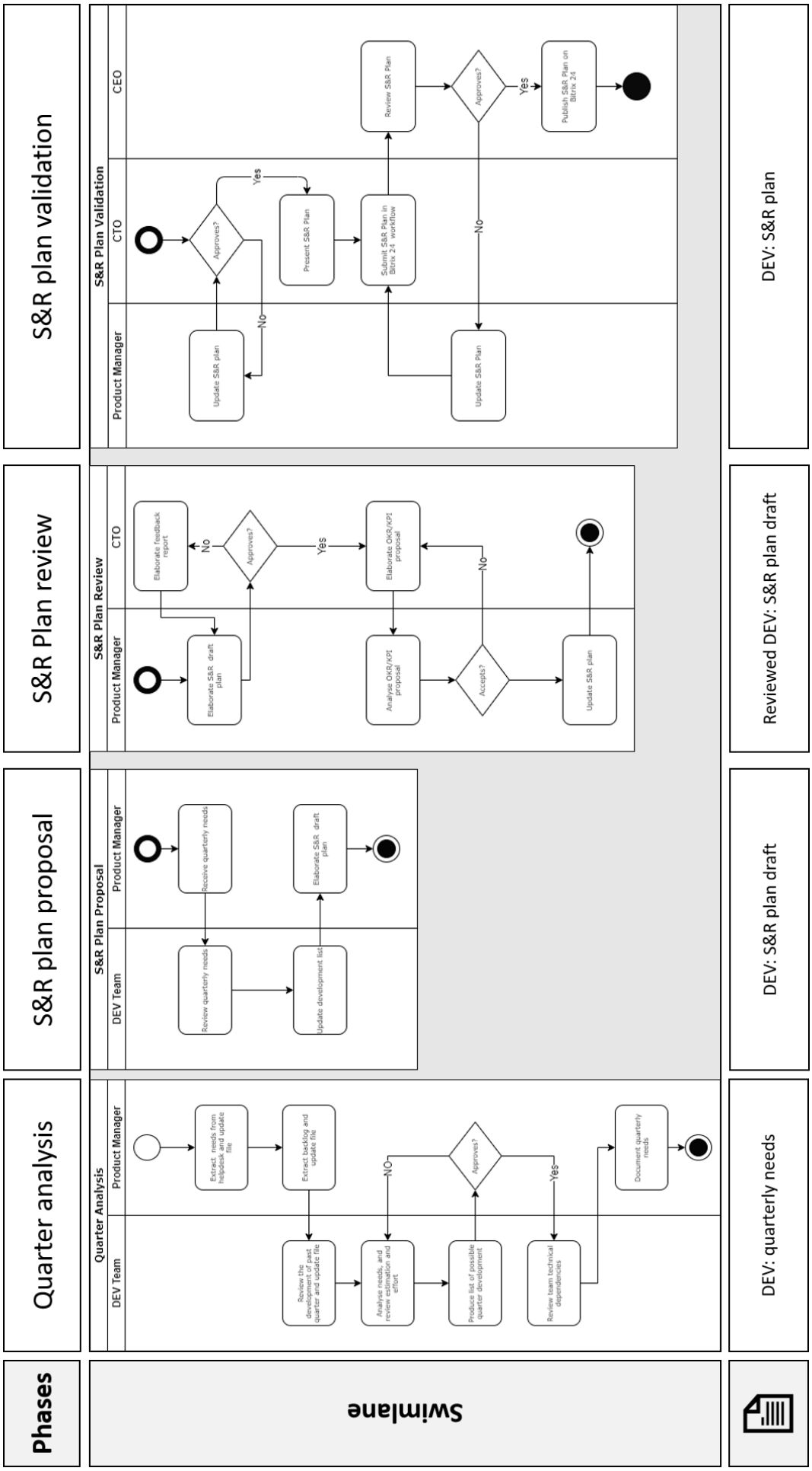
Author | Date | Version

APPENDIX F: Prioritization voting

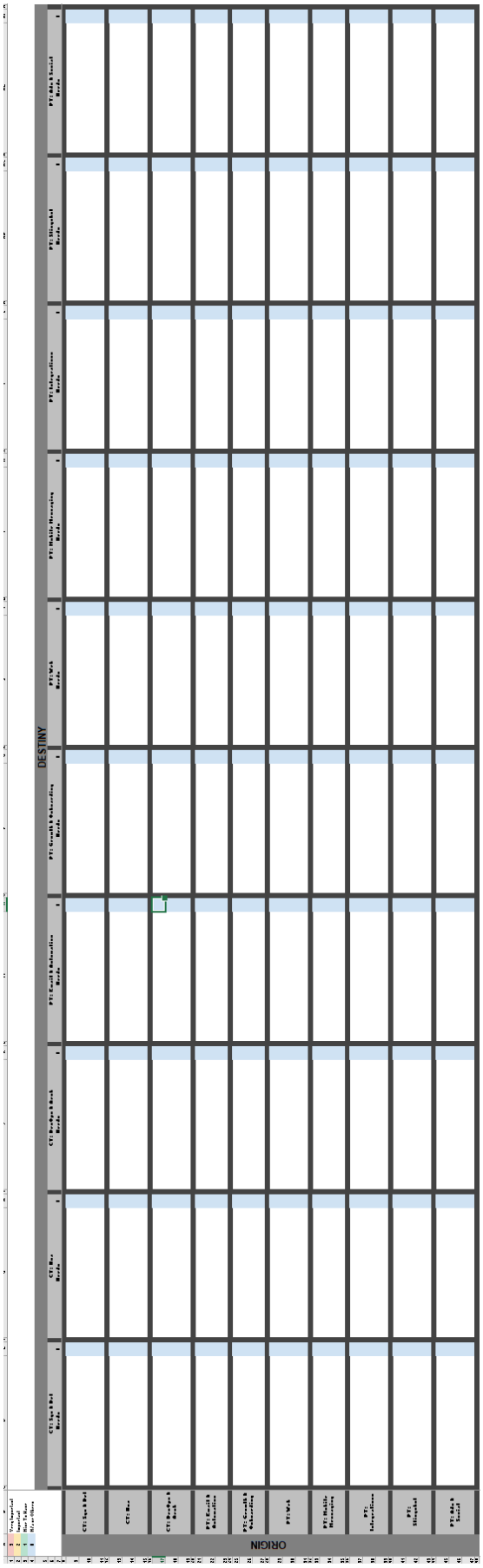
			Product Teams							TOTAL	
			Growth & Onboarding	Email & Automation	Mobile & Messaging	Web	Ads & Social	Slingshot	Integrations		
Management Processes	Strategy & Roadmap Planning	Importance	5	5	5	5	5	5	5	5,00	8,14
		Maturity	4	3	4	3	3	2	3	3,14	
	Team Performance Management	Importance	4	4	4	4	4	4	4	4,00	7,00
		Maturity	3	3	4	4	3	2	2	3,00	
	Knowledge Management	Importance	3	3	3	3	3	3	3	3,00	6,86
		Maturity	4	4	4	4	4	4	3	3,86	
Support Processes	Manage Human Resources	Importance	4	4	4	5	4	5	5	4,43	6,71
		Maturity	3	3	3	2	3	1	1	2,29	
	Ensure Culture Alignment	Importance	4	5	5	4	5	4	5	4,57	6,57
		Maturity	3	2	2	2	2	2	1	2,00	
	Manage Support Tools	Importance	3	3	4	3	3	3	4	3,29	5,43
		Maturity	2	2	2	2	2	3	2	2,14	
Core Processes	Bug Analysis	Importance	4	5	5	5	5	5	5	4,86	6,43
		Maturity	3	1	1	1	1	1	3	1,57	
	Improvement Analysis	Importance	4	5	5	5	5	4	5	4,71	6,14
		Maturity	3	1	1	1	1	1	2	1,43	
	Feature Analysis	Importance	4	5	5	5	5	4	5	4,71	6,14
		Maturity	3	1	1	1	1	1	2	1,43	
	Manage Backlog	Importance	4	5	5	5	5	5	5	4,86	7,57
		Maturity	3	2	3	4	2	3	2	2,71	
	Operational Planning	Importance	4	5	4	5	5	4	4	4,43	6,29
		Maturity	4	1	1	2	1	2	2	1,86	
	Acceptance Testing	Importance	4	4	4	4	4	4	4	4,00	7,00
		Maturity	3	3	3	4	3	3	2	3,00	
	Release Planning	Importance	4	5	5	5	5	4	5	4,71	6,71
		Maturity	3	2	1	2	2	2	2	2,00	
	Product Development Monitoring	Importance	3	3	3	4	3	5	5	3,71	6,57
		Maturity	4	3	2	2	3	4	2	2,86	
	Product Research	Importance	4	5	4	4	5	5	5	4,57	7,86
		Maturity	4	3	3	4	3	3	3	3,29	

APPENDIX G: Process Strategy & Roadmap Plan

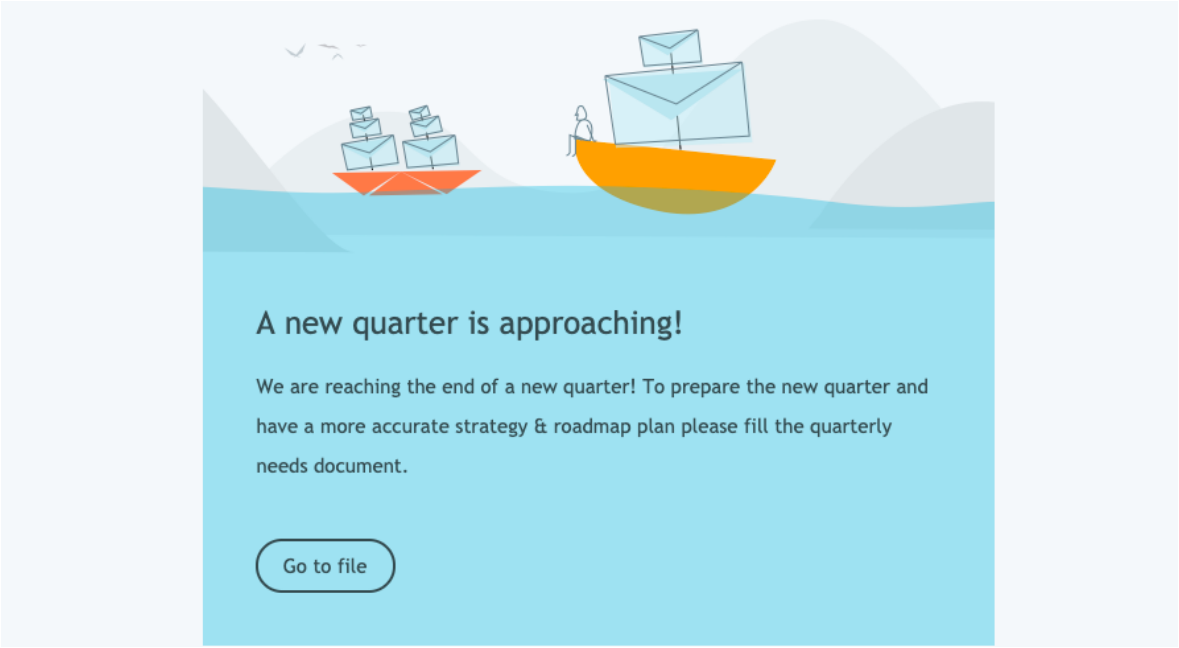


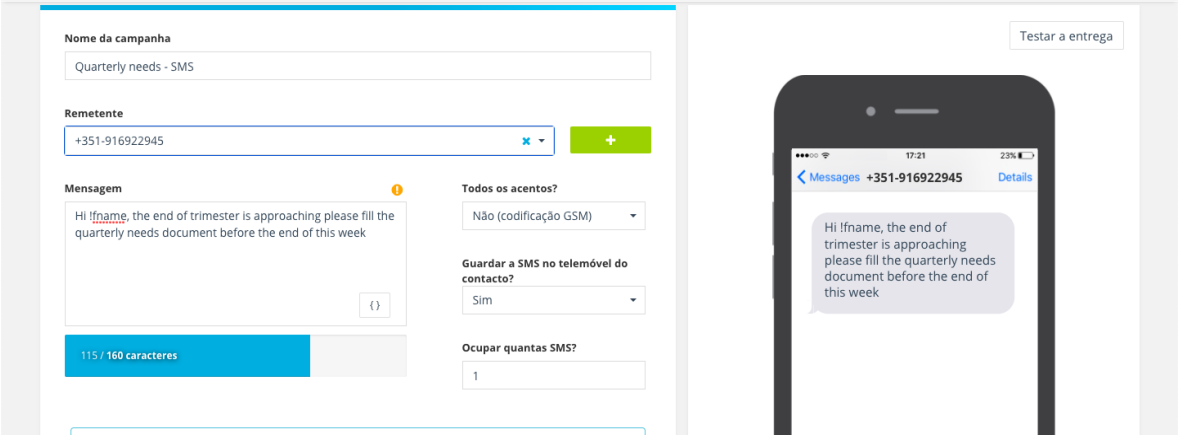

Phases
Swimlane
Quarter analysis
S&R plan proposal
S&R Plan review
S&R plan validation
DEV: quarterly needs
DEV: S&R plan draft
Reviewed DEV: S&R plan draft
DEV: S&R plan
Quarter Analysis
DEV Team
Product Manager
Extract needs from helpdesk and update file
Extract backlog and update file
Review the development of past quarter and update file
Analyse needs and review estimation and effort
NO
Approves?
Produce list of possible quarter development
Review team technical dependencies
Yes
Document quarterly needs
S&R Plan Proposal
DEV Team
Product Manager
Receive quarterly needs
Review quarterly needs
Update development list
Elaborate S&R draft plan
S&R Plan Review
Product Manager
CTO
Elaborate S&R draft plan
Approves?
No
Elaborate feedback report
Yes
Elaborate OKR/KPI proposal
Analyse OKR/KPI proposal
Accepts?
No
Update S&R plan
S&R Plan Validation
Product Manager
CTO
CEO
Approves?
No
Update S&R plan
Yes
Present S&R Plan
Submit S&R Plan in Bitrix 24 workflow
Review S&R Plan
Approves?
No
Yes
Publish S&R Plan on Bitrix 24

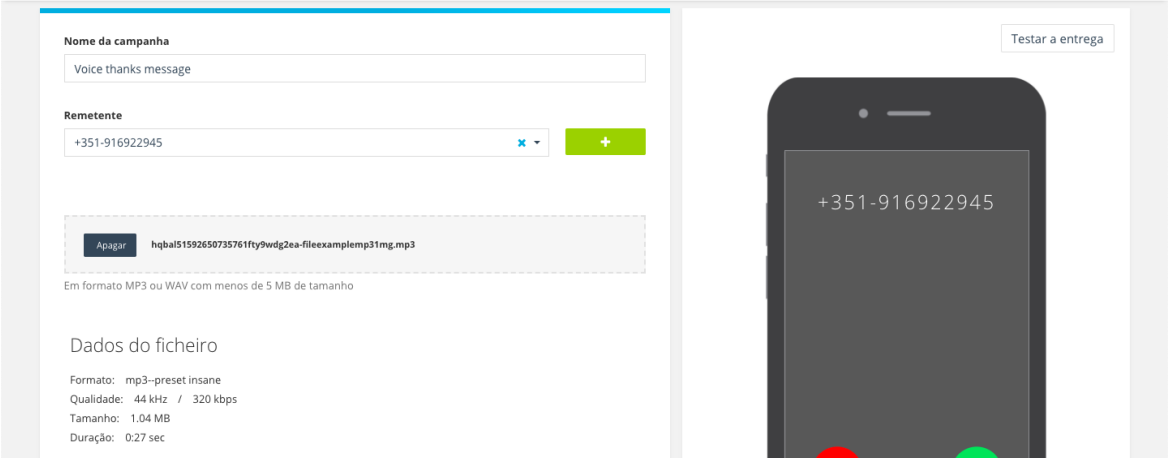
APPENDIX H: Quarterly needs tool



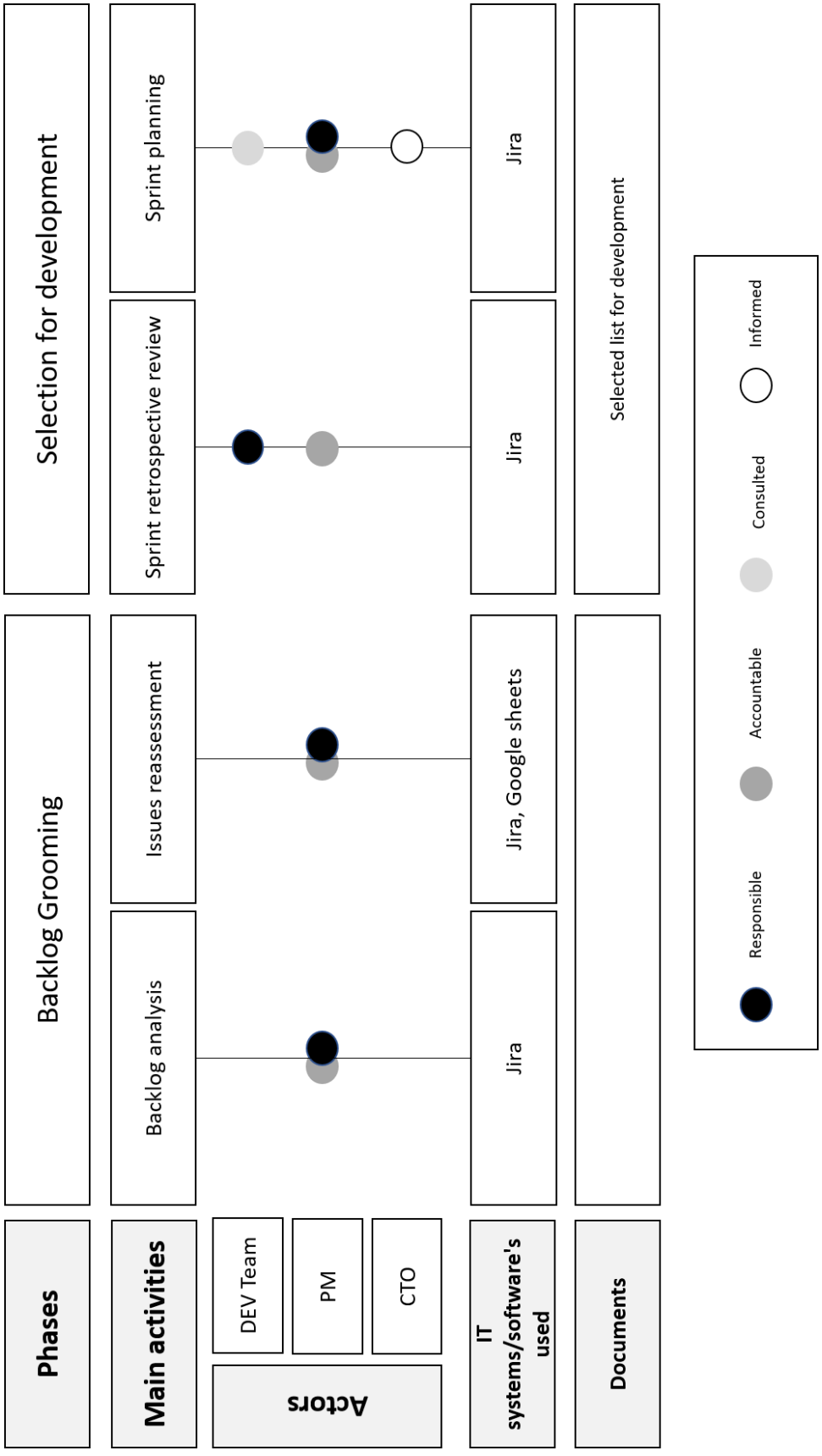
APPENDIX I: E-Goi Interfaces

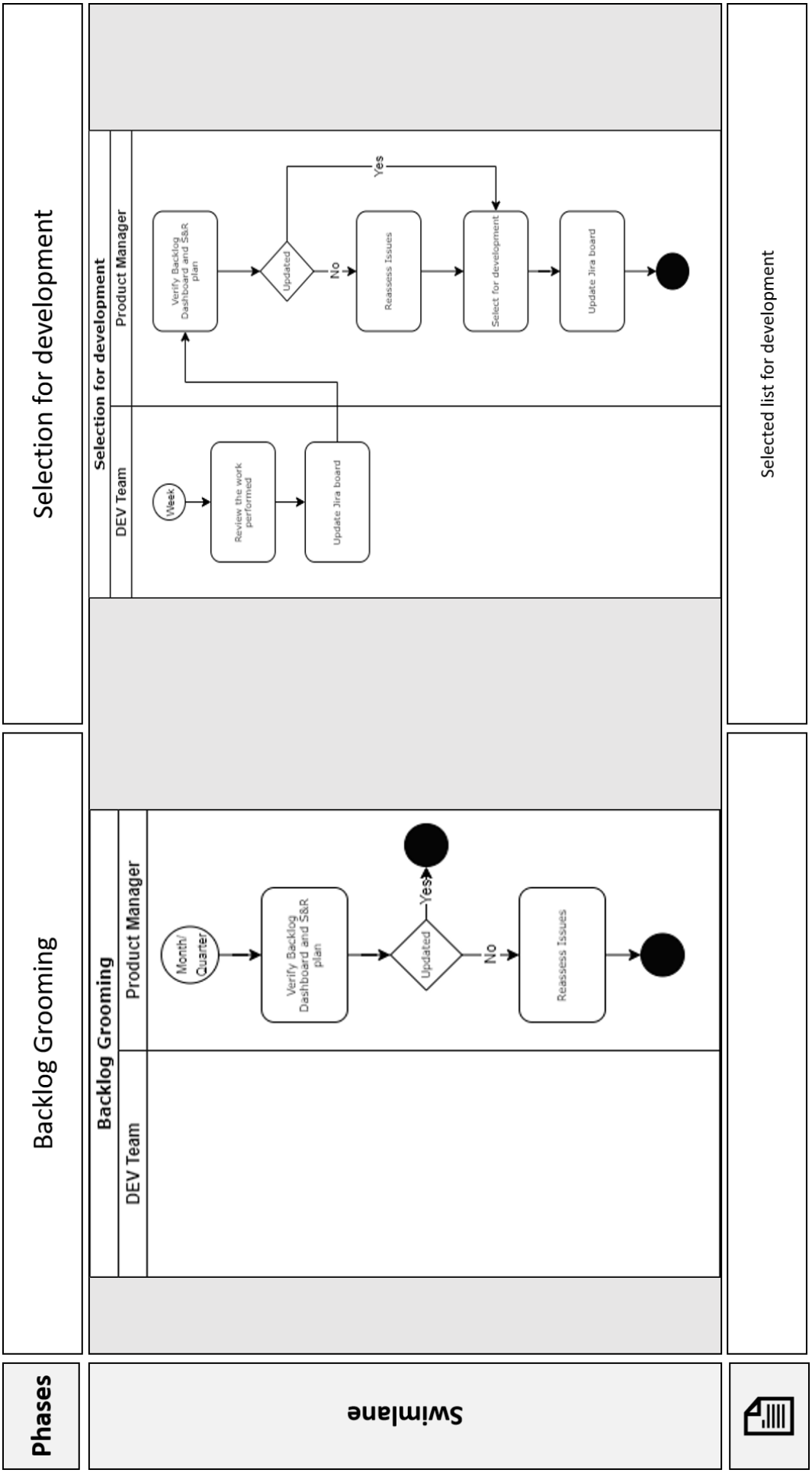




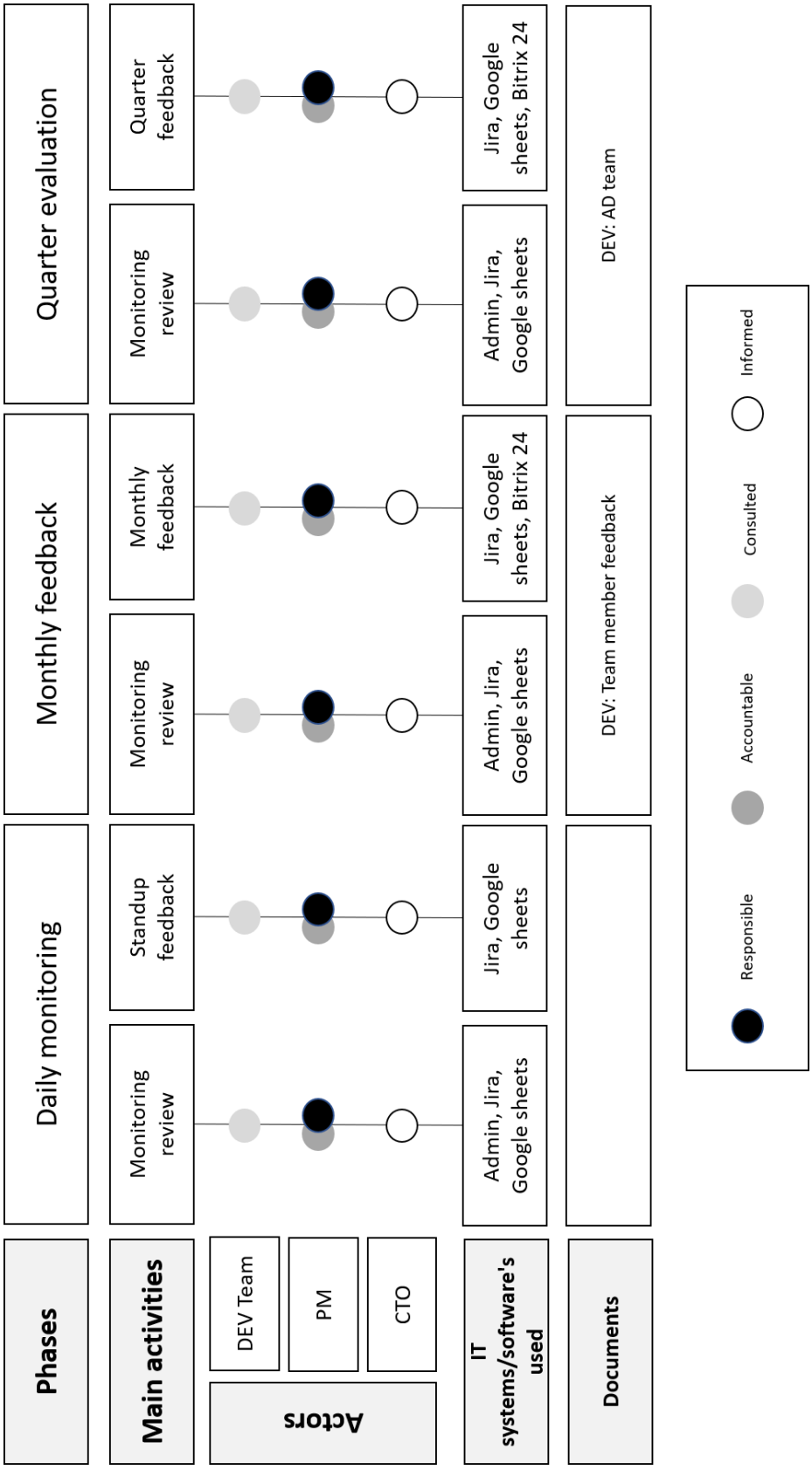


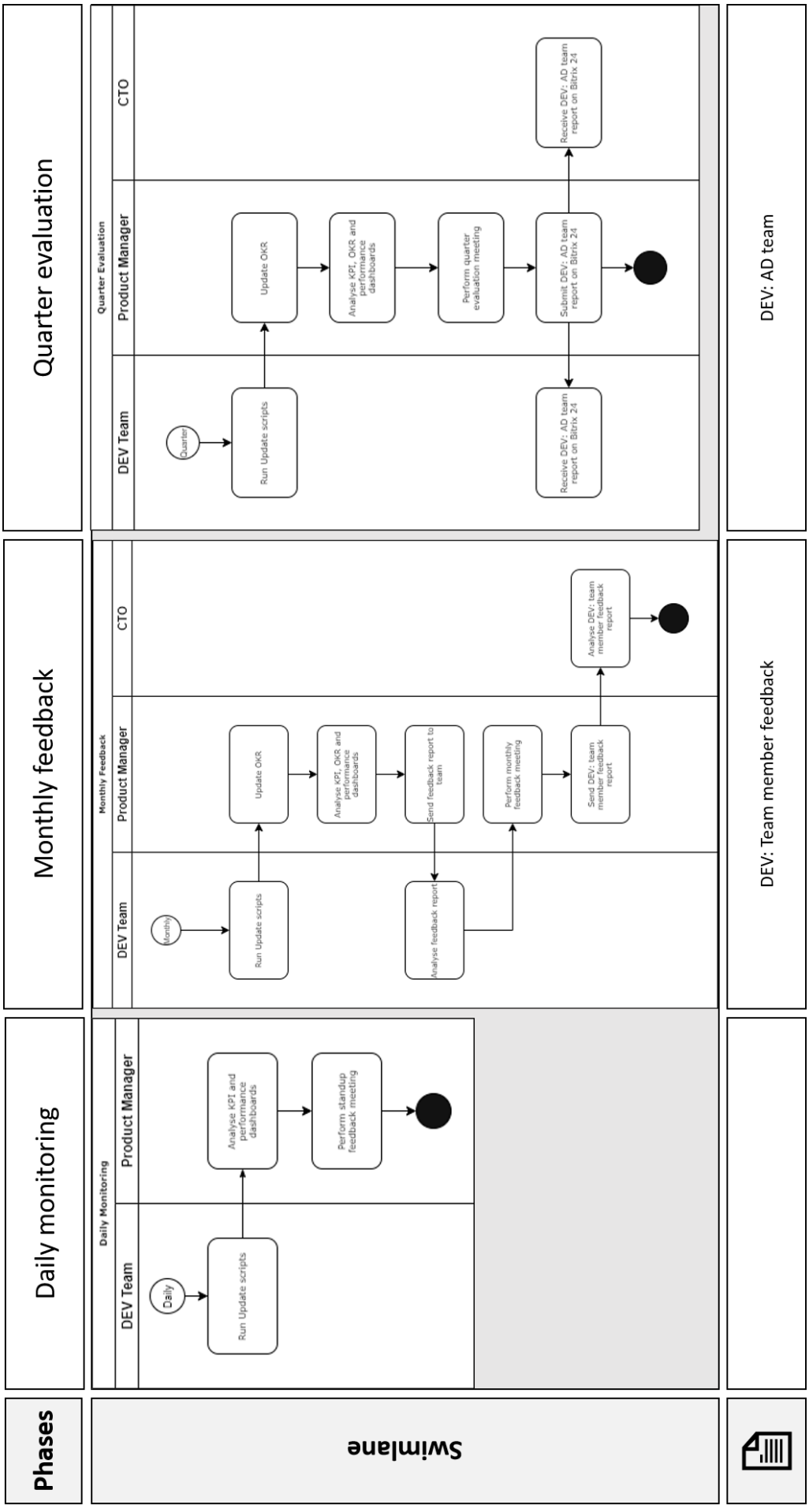
APPENDIX J: Backlog Management process



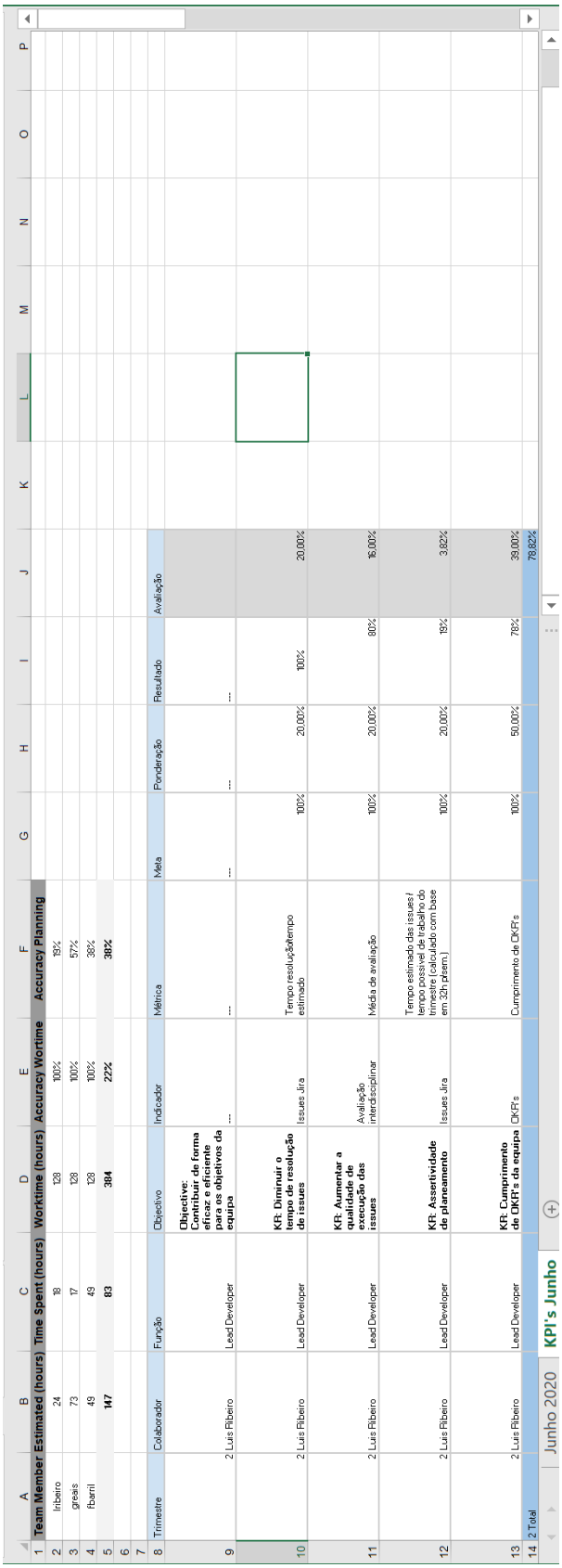

Phases
Swimlane
Backlog Grooming
Selection for development
Backlog Grooming
DEV Team
Product Manager
Month/ Quarter
Verify Backlog Dashboard and S&R plan
Updated
Yes
No
Reassess Issues
Selection for development
DEV Team
Product Manager
Week
Review the work performed
Update Jira board
Verify Backlog Dashboard and S&R plan
Updated
Yes
No
Reassess Issues
Select for development
Update Jira board
Selected list for development

APPENDIX K: Team Performance Management process




Phases
Swimlane
Daily monitoring
Monthly feedback
Quarter evaluation
DEV: Team member feedback
DEV: AD team
Daily Monitoring
DEV Team
Product Manager
Daily
Run Update scripts
Analyse KPI and performance dashboards
Perform standup feedback meeting
Monthly Feedback
DEV Team
Product Manager
CTO
Month
Run Update scripts
Update OKR
Analyse KPI, OKR and performance dashboards
Send feedback report to team
Analyse feedback report
Perform monthly feedback meeting
Send DEV: team member feedback report
Analyse DEV: team member feedback report
Quarter Evaluation
DEV Team
Product Manager
CTO
Quarter
Run Update scripts
Update OKR
Analyse KPI, OKR and performance dashboards
Perform quarter evaluation meeting
Submit DEV: AD team report on Bitrix 24
Receive DEV: AD team report on Bitrix 24
Receive DEV: AD team report on Bitrix 24

APPENDIX L: Team Performance Management Tool



Team Member	Estimated (hours)	Time Spent (hours)	Worktime (hours)	Accuracy Worktime	Accuracy Planning
lribeiro	24	18	128	100%	19%
greais	73	17	128	100%	57%
rbarril	49	49	128	100%	38%
	147	**83**	**384**	**222**	**382**

Trimestre	Colaborador	Função	Objectivo	Indicador	Métrica	Meta	Ponderação	Resultado	Avaliação
2	Luis Ribeiro	Lead Developer	**Objective: Contribuir de forma eficaz e eficiente para os objetivos da equipa**	---	---	---	---	---	
2	Luis Ribeiro	Lead Developer	**KR: Diminuir o tempo de resolução de issues**	Issues Jira	Tempo resolução/tempo estimado	100%	20,00%	100%	20,00%
2	Luis Ribeiro	Lead Developer	**KR: Aumentar a qualidade de execução das issues**	Avaliação interdisciplinar	Média de avaliação	100%	20,00%	80%	16,00%
2	Luis Ribeiro	Lead Developer	**KR: Assertividade de planeamento**	Issues Jira	Tempo estimado das issues / tempo possivel de trabalho do trimestre (calculado com base em 32h p/semn.)	100%	20,00%	19%	3,82%
2	Luis Ribeiro	Lead Developer	**KR: Cumprimento de OKR's da equipa**	OKR's	Cumprimento de OKR's	100%	50,00%	78%	39,00%
2	Total								78,82%