MESG

MESTRADO EM ENGENHARIA DE SERVIÇOS E GESTÃO

# Design of a Software System for Processes Improvement in a Technology Start-up

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**Master Thesis**

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*To my nieces Clara and Diana.*

## Abstract

The number of technological start-ups in Portugal has been growing exponentially and it is becoming more common among them to feel the phenomenon of growing pains when they have to adapt to their new dimension. These growth hurts usually have as a consequence the obsolete processes and the respective inefficiency of the employees, so the actions taken to combat these factors are decisive for the success in the growth of the company.

The present dissertation intends to study a process improvement solution that allows a better adaptability to the size of the company, as well as leave legacy for these new processes to adapt to the possible continuous growth of the company.

After a detailed study of the methods and processes currently applied in the company, a software solution was studied that would help to improve these same processes, either in their complexity or simply in the quality of the information used reducing human error.

This work then results in a software solution tailored to the company, which will not only reduce the complexity of processes (through simplification of procedures), but also improve the quality of information (through automation and consequent reduction of manual processes).


**Keywords**: Make-to-Order; Customization; Processes; Requirements Engineering; Information System.

## Resumo

O número de start-ups tecnológicas em Portugal tem vindo a crescer exponencialmente e é cada vez mais frequente entre as mesmas sentir o fenómeno das dores de crescimento quando têm que se adaptar à sua nova dimensão. Essas dificuldades de crescimento costumam ter como consequência os processos obsoletos e a respectiva ineficiência dos funcionários e, por esse motivo, as ações tomadas para combater esses fatores são decisivas para o sucesso no crescimento da empresa.

A presente dissertação pretende estudar uma solução de melhoria de processos que permita uma melhor adaptabilidade à dimensão da empresa, bem como deixar legado para que esses novos processos se adaptem ao possível crescimento contínuo da empresa.

Após um estudo detalhado dos métodos e processos atualmente aplicados na empresa, foi estudada uma solução de software que ajudaria a melhorar esses mesmos processos, seja na sua complexidade ou simplesmente na qualidade das informações utilizadas, reduzindo o erro humano.

Este trabalho resulta em uma solução de software adaptada à empresa, que não só reduz a complexidade dos processos (através da simplificação dos procedimentos), como também melhora a qualidade das informações (através da automação e consequente redução de processos manuais).


Palavras-chave: Make-to-Order; Customização; Processos; Engenharia de Requisitos; Sistema de Informação.

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**List of abbreviations**

API - Application Programming Interface

B&W – Black and White

CEO – Chief Executive Officer

CPU – Chief Technology Officer

CTO – Central Processing Unit

MTO – Make-to-Order

MTS – Make-to-Stock

QC – Quality Control

SRS – System Requirements Specification

# 1 Introduction

## 1.1 Project Background

Technology entrepreneurship became a global phenomenon with startup ecosystems emerging all over the world. According to the Economic Survey 2015-16, startups are growing at the rate of 5 times compared to 15 years ago. Startups are driving economic growth, creating jobs and positively impacting the economy, and Portugal is on the lead to become one of the best places to launch a technology company. The entry of the Web Summit in the Portuguese capital and the support given by the government to the start-ups are two of the main ingredients for this successful recipe. Since 2012 more than 84 million euros were invested by the Portuguese government in new businesses related with technologies (Slush and Atomico, 2017).

Startups are growing faster nowadays and somewhere in their path they usually find growing pains associated to the need of making a transition. One of the symptoms is usually a weak definition of processes: when the business grows, the original processes become obsolete and there is a need of redefining them accordingly to the new business scale, number of employees and/or company's vision. In order to redefine processes, there is also the need to create/modify the information systems to match the current needs and scenarios.

The present dissertation was developed at Platforme International with the purpose of improving startup organizational processes through the design of a new information system adapted to growing stages.

## 1.2 Platforme International

Platforme International is a technological startup funded in the beginning of 2015 by José Neves, Gonçalo Cruz and Ben Demiri, with the main purpose of allowing luxury brands to offer their customers the possibility to customize and personalize their own products. The main value proposition of the company builds on software development and high-quality 3D modelling: Platforme develops a programming interface (API) to be integrated in other sites, where the 3D customization tool will become visible for the brand's customers to modify the products' characteristics according to their preferences.

Platforme International also offers the possibility to manage sales as well as production - currently the company manages sales and production for 8 brands in different factories spread by Portugal and Italy. Since the customers are offered the chance to create a unique design according to their preferences, the production is exclusive and individual for each customer. This concept of 'make-to-order' manufacture requires then a careful monitoring of each order individually and real-time information about their production status in order to best manage production/delivery times and sales reporting, and the present dissertation aims to improve mainly this scenario in the company.

Platforme International's team is growing fast, as also is the need for a reorganization of its staff, processes and systems. The firm employs 53 people spread over three operational/business units:

- London, United Kingdom, where the company's headquarters are located;
- Porto, Portugal, where engineering, operational, design and 3D departments are located;
- Guimarães, Portugal, where finance, sales and export departments as well as the warehouse are located.

The development of the present dissertation occurred in Porto, Guimarães and London.

### 1.2.1 Structure of Platforme International

Platforme Group represents a set of three companies: Platforme International, Six London and Swear London. The first – Platforme – works directly with luxury brands and its value proposition builds on software development and high-quality 3D modelling; the second, Six London, provides services in design, production and distribution of luxury footwear & accessories for licensed brands; the third - Swear London– represents the first shoe brand in the world to offer fully-customizable sneakers – it was Platforme's first project, motivated by José Neves.

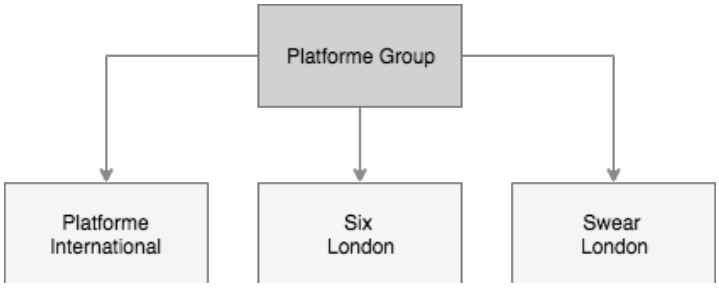


**Figure 1 – Structure of Platforme Group**

The present dissertation will be linked to Platforme International – however, due to the existence of shared activities, human resources and departments caused by the synergies between companies, there is frequent overlapping of these three segments in matters of people, processes or others.

On Platforme International's headquarters in London, the main activities performed are related with decision-making. The offices are common for the three companies, and the CEO works from there most of the time or travels abroad to attract new customers.

At the Guimarães office, the Financial group supports the financial matters for the three companies; the Purchases department places purchase orders in the different suppliers for the three companies; the Production department is responsible for the communication with factories

and production status follow-up, as well as quality control; the Shipment department is responsible for shipping orders and managing returns from the three companies.

Porto's office is constituted by:

- Operations: formed by project managers, delivery manager (responsible for all the activities that go from project definition to background configurations), and brand success manager (responsible for sales & marketing analysis);
- Engineering,:divided by Design, 3D and Software Teams, responsible for visual assets development;
- Amplification: responsible for the extension of sales channels for Platforme's brands;
- Human Resources, responsible for recruitment and hiring, compensation and benefits, legal compliance;
- Managing Director and CTO: responsible for decision making in all the matters related to the companies' performance and direction, as well as conducting the operational part of the projects.

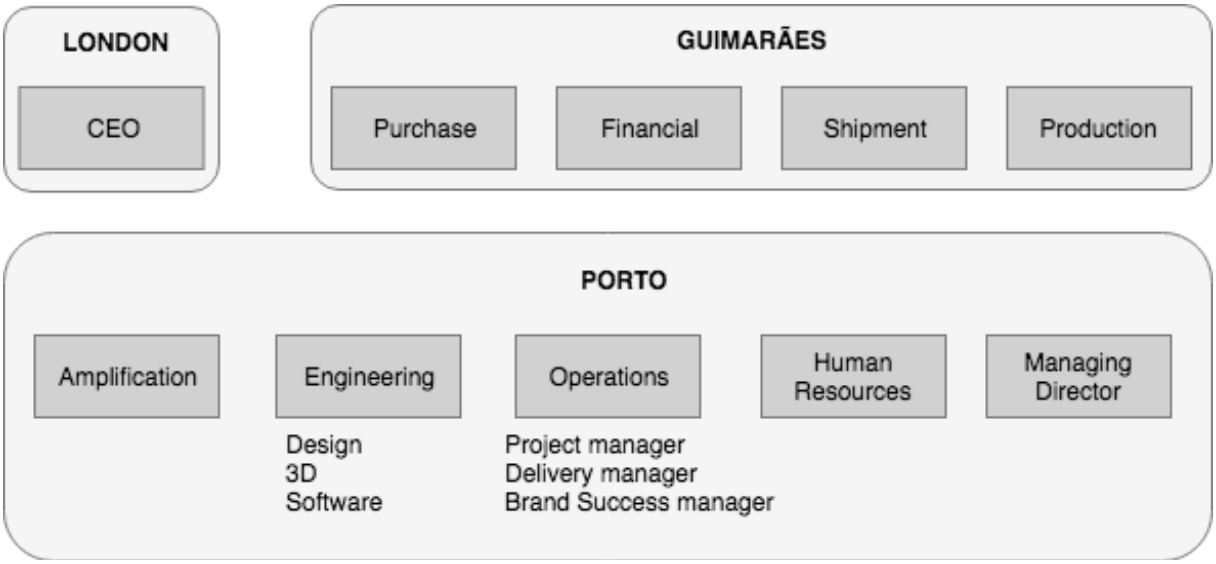


**Figure 2 – Structure and Geographic locations of Platforme International**

## 1.3 Problem Description

As the most recent member of the Platforme Group, Platforme International represents the company where the unknown is constantly explored and it becomes essential to make tests frequently. This makes this start-up and its members true explorers, which motivates them to find new solutions and make constant improvements to the services offered by the company. However, when reaching a certain degree of maturity, any business needs to readjust its processes to adapt to its new dimension. The set of activities that were supported by a single person, now needs to be delegated to a group of dedicated people; data that until then could be represented in a spreadsheet, starts to require a software dedicated to its management; activities

that until then were performed without planning, begin to require standard practices and procedures manuals; small amounts of data that could be easily analyzed start to need a tool that provides a wider view of the company's performance.

Plaforme International has reached that maturity level and these readjustments are imperative for the success of the company. Stock management, order monitoring, sales analysis and reporting – all of these activities and others need a unique, solid and trustable information system as foundation as well as redefined processes.

### 1.4 Project Objectives

The goal of this project is to optimize processes that are crucial to the company's core value proposition (by redesigning them or simply reducing their complexity) through the design of a centralized information system – RIPE Pulse. If data storage and display remain in one place, the following improvements are expected: Integration of various business areas' data from trustable sources; Real-time access to information integrated in a single platform; Reduction of processes' complexity; Reduction of errors associated with manual data transfer; Improved production management and reduction of lead times; Visibility of the performances through automated analysis.

The final outputs of this work should include:

- a listing of the set of requirements defined with the stakeholders of the referred activities: these requirements will be gathered through observation, questionnaires and interviews accordingly to Pohl's Requirements Engineering methodology and documented in a Software Requirements Specification document;
- the design of the new information system ready to be implemented: mockups will be created according to the requirements' elicitation and negotiation outputs;
- the design and clarification of the improved processes taking into consideration the new system functionalities.

### 1.5 Methodology

The methodology followed was based on four fundamental steps:

1. Analysis of processes AS-IS, and Information Systems used

   The first stage consists of an analysis of the current situation within the organization, in order to identify problems or failures that can be solved with the implementation of the RIPE Pulse information system. Through the understanding and design of the current processes it will be possible to obtain a clear vision of the opportunities for their improvement. The analysis of the systems used will also allow setting a fundamental basis for the perception of the needs of the future system. The analysis of AS-IS processes will be carried out using methods of observation, questionnaires and interviews.

2. Analysis and definition of requirements for the new Information System

   The best approach to understand how the future system can be most useful involves a requirements examination. The method applied will be Pohl's Requirements Engineering, and a top-down approach will be used according to the following steps: first, the purpose of the new software system is defined and presented in the form of and/or diagrams; then the stakeholders of the new system are defined; finally, the requirements from stakeholders, existing documentation and the systems used at the time are analyzed. This phase will result in the Software Requirements Specification document, which will contain the results of the analysis and definition of requirements and will serve as a basis for the future development of RIPE Pulse.

3. System design
   With the information from the previous phases, the necessary tools for the third phase will be available: the drawing of the RIPE Pulse system. Taking into account the AS-IS processes of Platforme International, it will be possible to devise ways of optimizing them and, above all, how the information system can assist in this optimization. The results of the requirements analysis and definition phase are another equally important source of inputs for system design - they will greatly condition its functionality, the information provided and the user experience of RIPE Pulse itself. This phase will also result in the design of the system architecture, presented in the form of class diagrams.

4. Modelling of processes TO-BE
   This phase consists of the redefinition of the internal processes of the company with the purpose of including the RIPE Pulse system. This phase occurs almost simultaneously with the previous one, since they are dependent on each other: in order to be able to model the optimized processes, it is necessary to design the new information system; however, in order to design the new information system, it is necessary to consider the new redesigned processes.

## 1.6 Report outline

This report is divided into six chapters, starting with the Chapter 1 where an explanation of the company's value proposition and its structure, as well as an identification of the research questions and methodology to be applied is given.

Chapter 2 covers the literature review, where concepts related to the project in question are presented and explained, namely: Make-to-Order production, creating value through customization and Pohl's Requirements Engineering methodology.

In chapter 3 the current scenario in the company, with an initial explanation of the methods applied to gather information about this same AS-IS state are discussed. The design of the current processes is also explained in detail in this chapter. The requirements analysis and definition are described in chapter 4.

The design of the software solution to be implemented through mockups of the future RIPE Pulse, and the reformulated processes resulting from the implementation of this same system are presented in chapter 5. At this stage, the improvements in the processes are explained in detail accompanied by the drawings of the new processes.

Finally, in Chapter 6 concluding remarks of the project, their outcomes and their impact on the company are presented. This chapter also includes topics for future developments.

# 2 Literature Review

This chapter aims to make the theoretical framework of the main themes related to this project. First, the subject of the Make-to-Order production will be approached, making a comparison with the classic Make-to-Stock production, since the first one is closely linked to the company's value proposition and the purpose of this project. Next, the creation of value through customization will be described, and the reasons why this approach has been gaining more and more followers; examples of success of these followers will be specified. Finally, there will be an elucidation about Requirements Engineering according to Pohl, since this methodology will be applied in the present project to meet the requirements for the new RIPE Pulse software system.

## 2.1 Make-to-Order Production

In classic Make-to-Stock (MTS) production, the goal is to sell to the customer what has already been produced and is in stock. It is the so-called 'push' method, where the finished product meets the customer at various distribution points, and where the quantities produced are based on demand forecasts. This method is closely linked with products that represent basic daily needs, hence with more easily predictable demand forecasts.

The purpose of this type of manufacturing is generally focused on the improvement of production times and labor and / or raw material costs, which rapidly lead to the production in scale and normalization of processes in order to maximize the associated fixed costs of the production. It is easily understood that the variable 'quantity produced' is inversely proportional to the variable 'average production cost'.

One of the drawbacks of 'make-to-stock' production is related to the risk of incorrect forecasts of demand for the product in question. As a consequence, it can lead to a lack of stock to respond to demand or, in an opposite scenario, to excessive inventory. In the first case, there is a loss of opportunity; in the second, products usually become obsolete (mainly with the advancement of technology and the rapid variation of fashion), and therefore there are times of balances in order to sell excess stock.

But when discussing make-to-order (MTO) production, the scenario gets different and somehow more complex. This method represents a manufacturing process in which manufacturing starts only after a customer's order is received, hence there is more flexibility in customizing the products to meet the specific needs of individual customers. It is considered a pull-type production because manufacturing is performed only after the demand is confirmed.

There is inconstancy in production times due to the greater number of variables in question and their instability is extremely high. The scale of production is considerably smaller, and in some cases, it may even be singular and one-off. As a consequence of this, the order response time is

higher and the prices associated with the made-to-order products may also be higher (Gupta and Benjaafar, 2004).

Because of mass customization and competition on product variety, many firms adopt an MTO strategy to offer a higher variety of products. Dell's manufacturing and distribution of Personal Computers (PCs) is an excellent example of an MTO supply chain. Dell typically offers several lines of product, with each allowing at least dozens of "features" from which customers can select when placing an order—different combinations of CPU, hard drive, memory and other peripherals (Vidyarthi, Elhedhli and Jewkes, 2009).

Despite the negative scenario regarding the longer response time as well as the higher average cost of production of the article, there are more and more companies adopting this method of production over make-to-stock. Having said that, it is easy to conclude that there will be advantages to it:

- no stock, eliminating the inventory of finished goods;
- reduced risk of obsolescence;
- opportunity to offer better quality, since the products are made with more rigor, exclusivity and attention to detail.

**Table 1 - Make-to-order compared to Make-to-stock production** (Hendry and Kingsman, 1989)

| Characteristic | Make-to-Stock | Make-to-Order |
|---|---|---|
| **Product mix** | Many standard products | Few standard products |
| **Resources** | Specialist machinery and workforce | Multi-task machinery and flexible workforce |
| **Product demand** | Demand for standard products can be forecast | Demand is volatile and can rarely be predicted |
| **Capacity planning** | Based on forecast demand. Planned well in advance. | Based on receipt of customer orders. Cannot be planned in advance. |
| **Product lead time** | Unimportant to customer. Can be set internally. | Vital for customer satisfaction. Agreed with customer. |
| **Prices** | Fixed by the producer. | Agreed with customer before production commences. |

## 2.2 Creating value through customization

Adding value to services or products through customization emerges to be an opportunity for companies to stand out and it has been increasingly adopted by several brands with admirable results. Dell was a pioneer in this field by allowing customers to order computers that are built entirely to spec – it really differentiated the company in their earlier days and helped the company to build a name. Then, the trend started: Harley-Davidson with its motorcycles, Nike with its NikeID shoes that allow customers to personalize their choices online, Pepperidge Farm with customers designing Goldfish crackers, Trek enabling cyclists to build a bike from the ground up, Brooks Brothers allowing men to create their own suits, Starbucks and Coca-Cola creating products that let consumers alter them to fit their own tastes.

It is common to observe this demand for customization every day at restaurants when people ask for ingredients to be held or added to dishes. Every customer is unique with their set of demands or needs – and they want to have things that are tailored to their personal needs and interests. What until now were homogeneous markets have evolved to become fragmented and heterogeneous, with customers expressing their individual needs. The sense of satisfying individual customers' needs has become a major differentiating factor among products and services (Norman, 1999). Customized products can increase the engagement between the brand and the customer as they have the capability to impact positively how buyers perceive their relationship with both the brand and its products. And, in the end, not only the company ends up with a more engaged customer, but it can also charge a premium price for the exclusivity of the customized product (Press, Leibold and Holt, 2005).

Another opportunity for customizable product markets is related with reaching specific consumers, mainly the ones whose preferences are difficult to guess or simply change fast. A good example is the millennial generation, a growing customer force known by their ease to be persuaded by social media and digital influencers (Spring and Dalrymple, 2000). Companies that offer customization are able to overcome this obstacle and please a greater number of potential buyers.

By offering customizable products, besides all the advantages explained before, the companies have the opportunity to stay one step ahead of the competition: the customization option converts the customers into designers, which allows the companies to get insights from those customized designs and have real time feedback from the customers' preferences (Du, Jiao and Tseng, 2006).

For all of the reasons above, customization is becoming more and more a fundamental dimension of the customer experience - in the words of Forrester analyst JP Gownder (2010), "*customization is the future of products."*

## 2.3 Requirements Engineering

The classic definition of a requirement can be taken from the IEEE Standard 610.12 (1990):

1. A condition or capability needed by a user to solve a problem or achieve an objective.
2. A condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification, or other formally imposed documents.
3. A documented representation of a condition or capability as in (1) or (2).

According to Pohl, the process of eliciting, documenting, and maintaining these requirements defines the Requirements Engineering activity, where the needs are developed into detailed requirements which are documented and specified to serve as the basis for all other software development activities [Pohl, 2008].

According to Pohl (2008) there are seven types of requirements:

- Functional requirements – define services the system should provide, behavior of the system and in some cases also what the system should not do;
- (Non-functional) Quality requirements – define quality properties of the system, a component, a service or a function (e.g., performance);
- Constraints – an organizational or technological requirement that restricts the way in which the system shall be developed;
- Business requirements – represent high-level objectives of the organization or customer who requests the system;
- User requirements – describe user goals or tasks that the user must be able to perform with the product.
- System requirements – requirements for the system as a whole (which may include hardware and software components);
- Software requirements – derived from system requirements (by allocating system requirements to software components and detailing them).

For a requirement to be considered valid, several characteristics must be taken into account. A requirement must be clear, complete, unambiguous, consistent, necessary, feasible, code-free, verifiable, understandable – and some more. The reason for this is linked to the need to have the requirements defined without there being any uncertainty of their meaning and purpose.

In a Requirements Engineering process, the sources to find the requirements are usually the stakeholders (person or an organization that has potential interest in the system to be developed), the existing documentation and/or the existing systems.

Requirements Engineering is divided in four main activities. Figure 3 shows s spiral model view of the four activities:

- Elicitation – the process of obtaining requirements from stakeholders, using different techniques;
- Documentation – this activity uses natural language or conceptual models to describe the requirements elicited previously;
- Validation and Negotiation – documented requirements must be validated and negotiated early on, to guarantee that all the predefined quality criteria are met;
- Management – responsible for dealing with the requirements documents and artefacts, it runs together with all other activities, is responsible for maintaining the consistency after changes, and ensure their implementation.

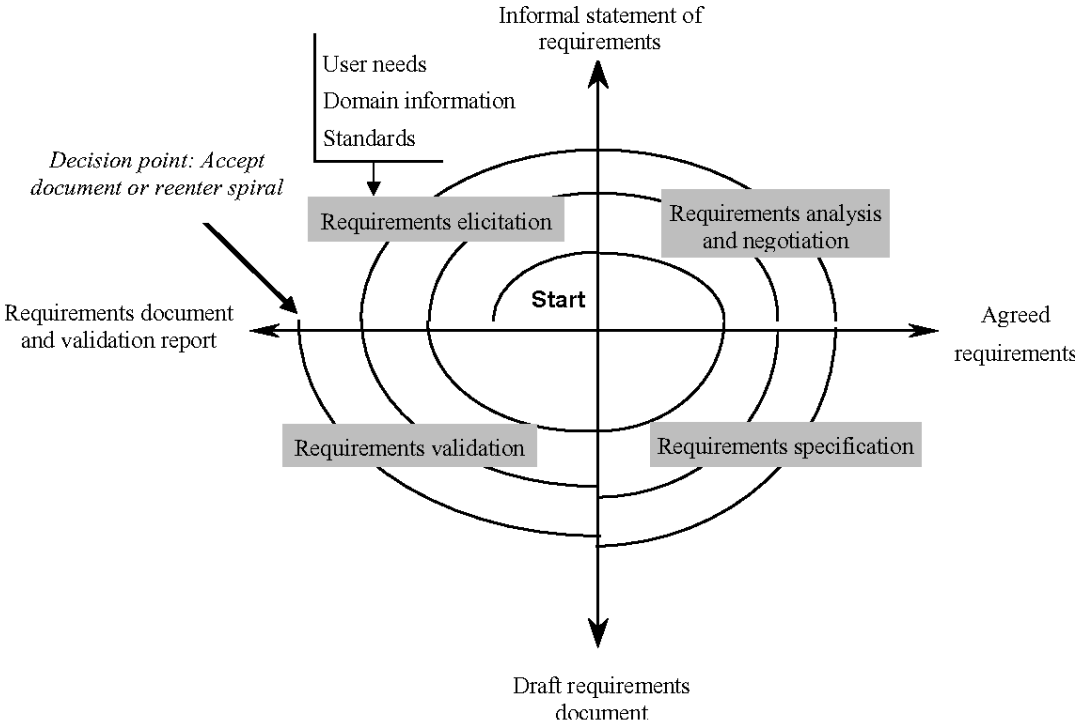


**Figure 3 - Spiral model view of the four activities of Requirements Engineering** (Kotonya and Sommerville, 1998)

## 3 Current scenario at Platforme International

For a better understanding of the current scenario concerning processes at Platforme International, three main activities were performed: observation, questionnaires and interviews.

### 3.1 Observation

The simple observation of the elements of the company in day-to-day activities allowed a broad understanding of the main activities, processes and real needs of the people. This observation was essential for designing a first level of processes in each main activity (macroprocesses), and consequently defining which activities and stakeholders would fit in this project's purpose.

In the end of this stage, a full notebook was filled with register of all day-to-day activities, and sketches were regarding the processes that were applied in that moment.

### 3.2 Questionnaires

On a second stage, questionnaires were presented to 15 employees from 5 different departments. After a brief introduction to the questionnaire's purpose, the project scope and guidelines to the document, the participants were asked to answer individually to the following questions:

1) What are the three tasks that occupy you the most time during work?
2) Do you feel that any of these tasks do not take advantage of your abilities, although they have to be done anyway?
3) If so, could it be reduced by changes in the existing software(s)?
   - □ Yes
   - □ No
   - □ Don't know/don't want to answer
4) If so, which kind of changes?
   - □ New features in the existing software system(s)
   - □ More user-friendly software system
   - □ Automatic data import
   - □ Integration of different software systems
   - □ Other: _____
5) What do you consider most useful in the software system(s) you currently use? (Please indicate the software system's designation and its features)
6) What do you consider less useful in the software system(s) you currently use? (Please indicate the software system's designation and its features)

The questionnaire was composed by 6 questions: four open questions, one question of single option and one question of multiple options. The purpose of the questionnaire was to understand how satisfied are the employees about the existing software systems that support their individual tasks, and also if employees considered that the existing software systems could be improved in order to adapt to their needs.

This action was truly important to get a reasonably detailed understanding of the activities performed by the employees from that sample, and the link to the currently used software systems. Due to the impersonal nature of this activity and motivation to deliver the answers faster, most people answered with short sentences with low level of detail, which reinforced the necessity to perform more personal interactions.

### 3.3 Interviews

For that reason, on a third and final stage, interviews were performed with the answers from the questionnaires as a basis. The main purpose of the interviews was to obtain all the possible detail of the processes and, consequently, understand and design microprocesses. This was the most crucial and surprisingly revealing activity from all three: there was a clear frustration from the employees regarding the lack of procedures clarification resulting from the company's growth. For this reason, it was possible to notice the willingness to help and contribute to this project in order to improve processes, resulting in a significant volume of new and undeniably useful information.

### 3.4 Processes AS-IS

As a result of the steps specified previously, the current processes at Platforme International were identified as characterized as seen in Figure 4:

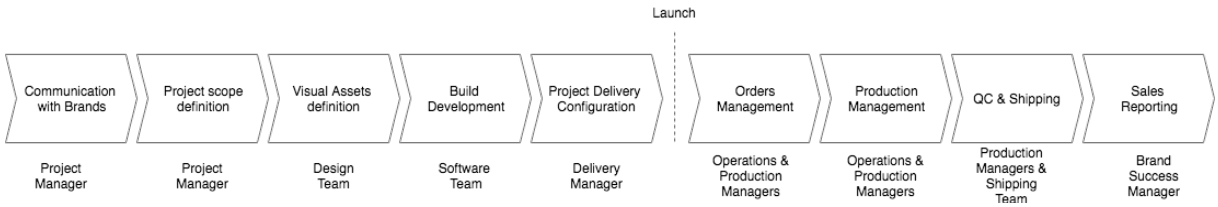


**Figure 4 - Macroprocesses at Platforme International**

- Communication with brands – Platforme's commercial team presents its product to the brand in order to build a new partnership.
- Project scope definition – After the contract has been signed, the brand and Platforme jointly define the objectives of the project - which products to be customized; in which combinations of parts, materials and colors will the option of customization be offered; how will the user experience the site; what is the launch date of the project; who is responsible for the production, among others.
- Visual assets development – After defining the product(s) to be offered in the customization tool, the design team starts developing the visual assets. This process includes modelling, texturing, rendering and SSI development. These tasks can vary depending on whether the projects are 3D or 2D.
- Build development – The engineering team is responsible for developing the customization tool after receiving the visual assets from the design team. This task includes the code development to combine the visual assets created with the features of the customization tool, and also varies according to the type of project, as well as sales channels.

- Delivery configurations – When the build is ready, the delivery manager is responsible for configuring the tool created by the software engineers according to the settings previously defined with the brand, such as prices, currencies, languages, sales countries, etc.
- Order management – After the launch of the project, the sales phase begins, so there shall exist a record of the sales data of each brand, such as the channel, date, price, order value, destination country, model sold, etc. This data is manually entered into Shared Spreadsheets and edited by several employees with different responsibilities for updating the order status. The spreadsheets serve as a basis for activities such as sales reporting, financial analysis or production management.
- Production Management – For licensed brands the production is made by Platforme, and it is outsourced to factories in Portugal (Guimarães and São João da Madeira) and Italy. This production lacks follow-up and updated information on the status of each product in order to schedule shipments. Contacts with factories, production orders, stock management of raw materials, status of the order, among others, are the responsibility of production managers, and these are mainly based on the spreadsheets mentioned above. As in the case of order management, spreadsheets are edited by several people with different responsibilities for updating the production status.
- Quality Control and Shipping – As soon as the production of the articles is finished, these are subject to quality control, followed by photographic registration and, finally, dispatch of the articles to the client.
- Sales Reporting – Includes the exhibition of all the sales during a particular time frame per brand, with relation to marketing activities and interpretation of cause-consequence between them.

Although several stages of the whole process (from commercial activities, to project management, online sales, production and delivery) would benefit from intervention, due to its contained nature, the present dissertation will be focused on a well-defined window that embraces only the activities performed after launching the project (Figure 5): Orders Management, Production Management, Quality Control & Shipping and Sales Reporting.

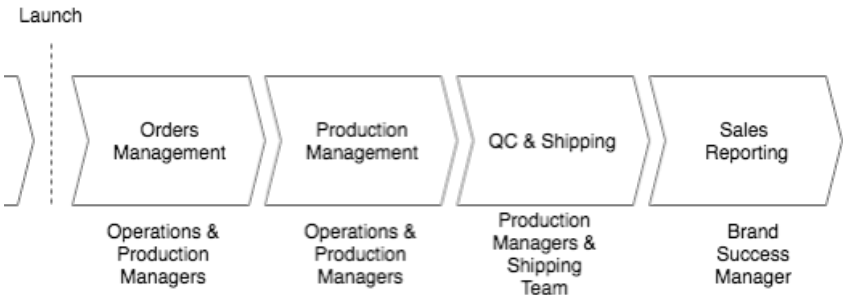


**Figure 5 - Macroprocesses performed after Project launch**

### 3.4.1 Orders Management

Before sending the information to the factories about what to produce, it is necessary to register the sales in the excel file, organize the orders by brand and type/model and finally, distribute them by the factories responsible for the production. At the same time, follow-up is performed for the returns and cancellations that may arise and, in case it is necessary, to stop production and communicate with the factories.

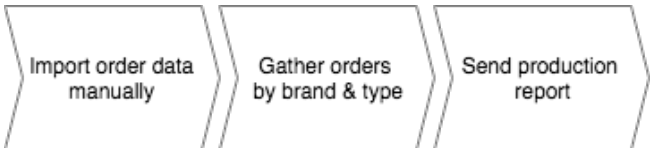


**Figure 6 - Microprocesses of Orders Management**

The operations team, located in the Porto offices, manually imports the order data into an Excel file. There are several sources for receiving orders (Figure 7):

- Farfetch Sales / Storm (sales on Farfetch.com and / or on websites developed by Farfetch, designated Black & White websites);
- Main RipeCore (in-store sales of brands licensed by Platforme International);
- Brand RipeCore (online sales of brands with independent website);
- Email box (sales in channels whose process is not yet automated, so it is sent manually by email).

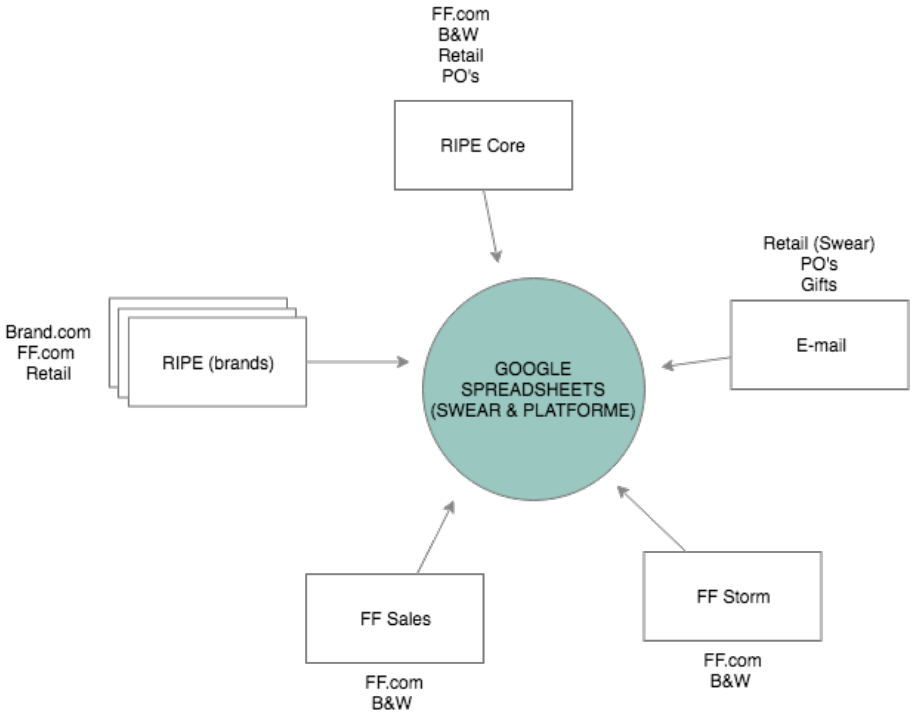


**Figure 7 - Several sources for receiving orders**

After that, the team accesses Main RipeCore or Brand RipeCore to download the production report to be shared with the factories. At the same time, in case the product ordered contains exotic leathers, the production team must request a license called 'CITES', by filling an online form requesting documents relating to the purchase of the leathers. Once the mentioned tasks have been completed, the production team aggregates the orders by brand and, if applicable, by type, and e-mails them to the production team located in Guimarães.

As soon as the email with orders is received, the production team prints all the production reports (a standard file with the characteristics of the article to be produced) and gathers the materials needed for its production. The lack of stock of some of the raw materials (stock that is mostly managed through an Excel sheet), may lead to delays in the beginning of the production of the article. Once all the materials needed for the production of the article are separated and ready for delivery to the factory, a team member will go to the factory to deliver them along with the production report. If the raw materials are already in the factory (e.g. Italian factories), only the production reports are sent. Figure 8 represents the ‘AS-IS’ flowchart for Order Management process.

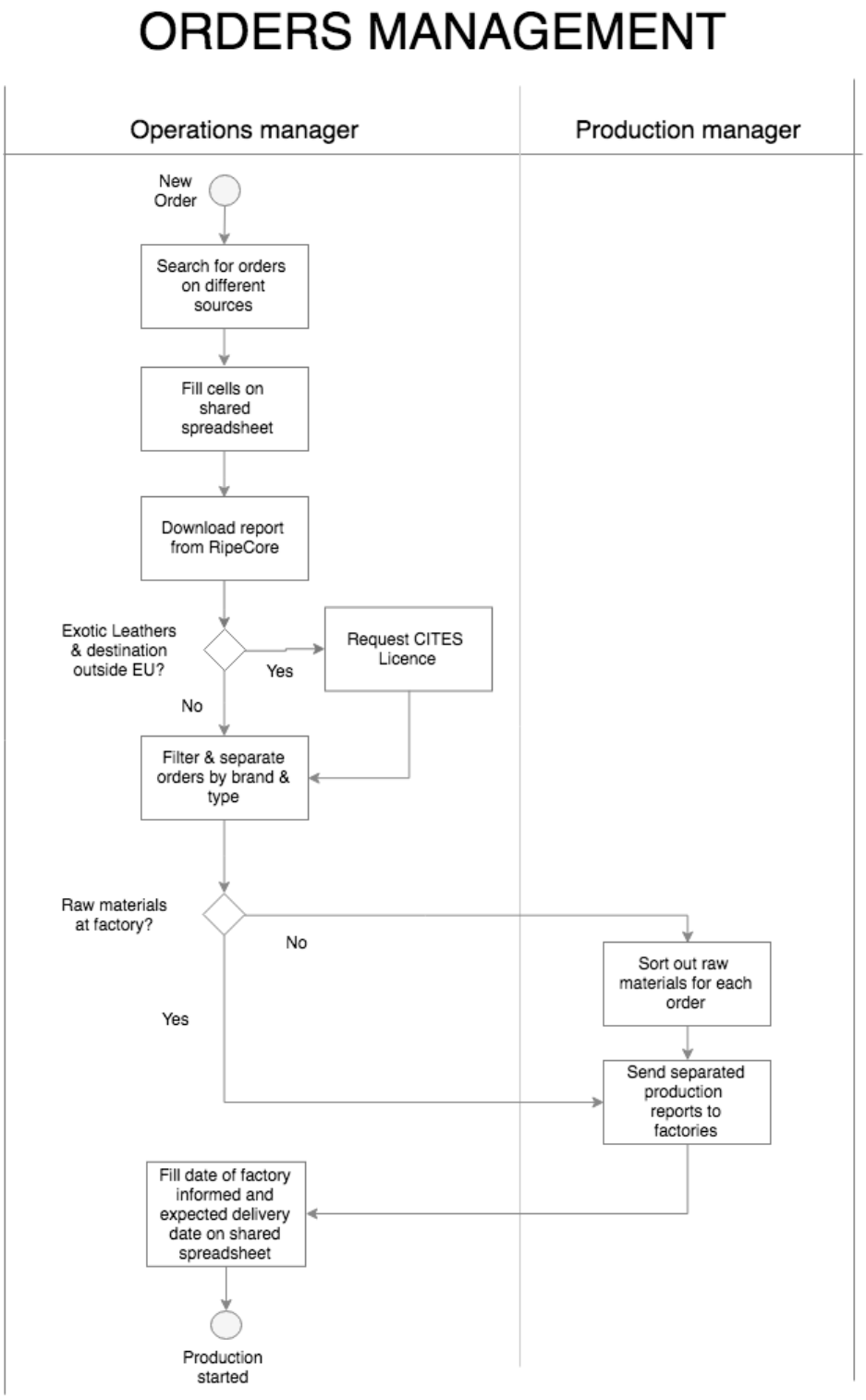


**Figure 8 – Processes 'AS-IS': Orders Management**

Whenever a cancellation occurs, the process is even more complex. The operations team realizes that an order has been canceled if informed by email or, in the case of sales through Farfetch.com or B&W, if they look for the information in the cancellation section in 'Farfetch Storm' tool. The first step is to analyze the reason for the cancellation: if it is an acceptable reason (fraud, wrong price calculation), the operations manager accesses the shared Excel file to change the status to 'Canceled', enter the order cancellation date and the reason for its cancellation. Then the operations manager checks if the production has already started or if it is still possible to abort the production and finally alerts the financial team by email if there are costs associated with cancellation. Figure 9 represents the 'AS-IS' flowchart for Order Management (Cancelations) process.

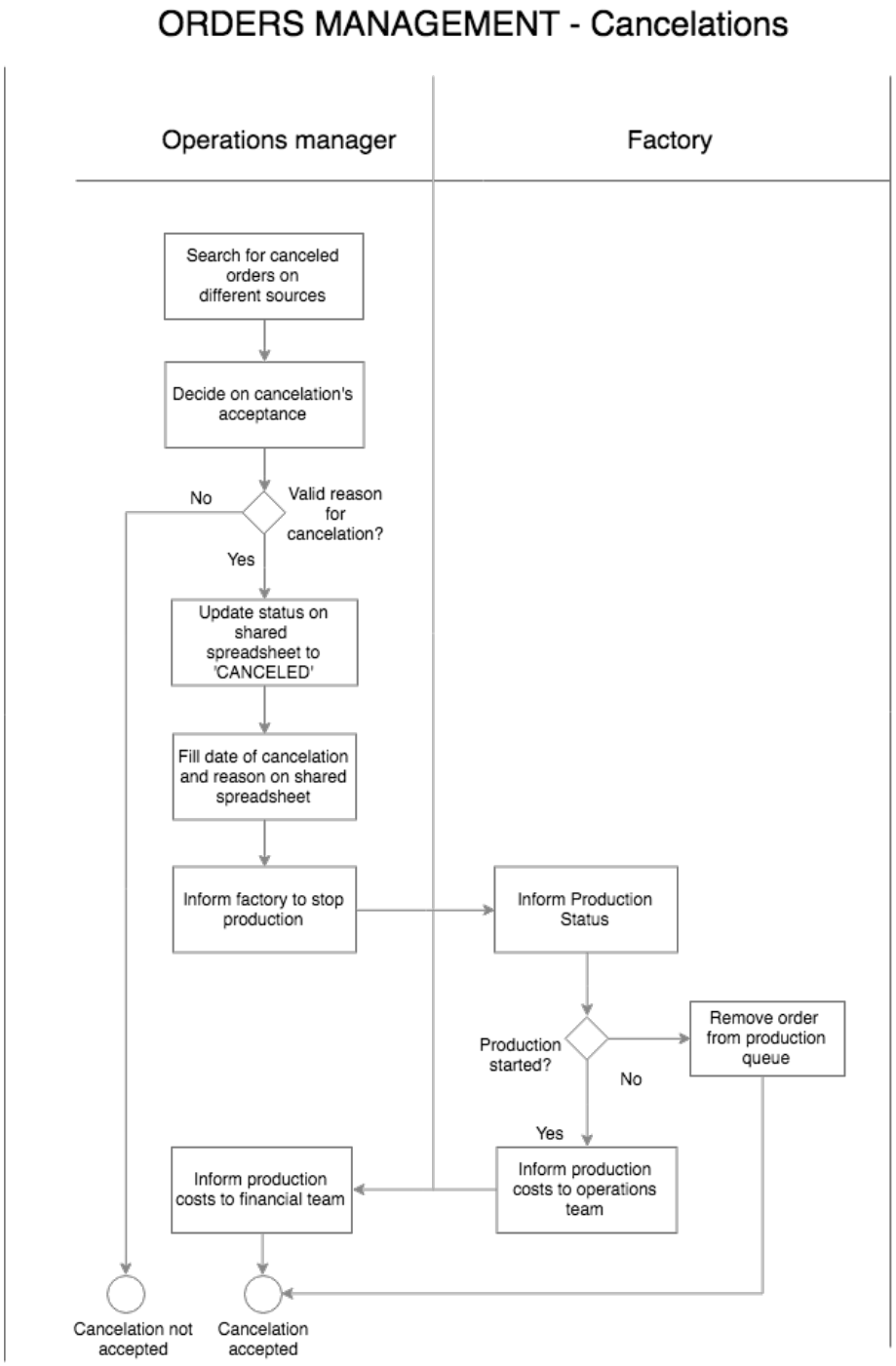


**Figure 9 - Processes 'AS-IS': Orders Management (Cancelations)**

The procedure is very similar in cases of returns: the sources of information on returned orders are the same, but at the same time, the physical return of the article in the warehouse at Guimarães to the Shipping team occurs. Although the customer is required to complete a return order form while returning the physical item to the warehouse, compliance with only one of the two requirements often occurs. For this reason, it is imperative that the return data is updated in the Excel shared file so that no doubts arise when the returned item is received in the warehouse. If there are returns in the warehouse, the first step of the shipping team is to check if there is a request for a return in the system by the customer. Only with the existence of this return request can the analysis of the reason for the return be made (customized articles cannot be returned or refunded except in the case of poor product quality, production error or other exceptional reason considered plausible). If this is an acceptable reason, the operations manager accesses the shared Excel file to change the status to 'Returned', enter the order return date and the reason for that return. If it is not, the shipping team rejects the return order in the system. In this process, there is a high risk of occurring lack of communication between the various parties involved: there are several communication channels where questions arise regarding the status of orders and their location, which may generate loss of information and misunderstandings. As a consequence, some returns may be left unattended for long periods, which leads to customer dissatisfaction. Figure 10 represents the ‘AS-IS’ flowchart for Order Management (Returns) process.

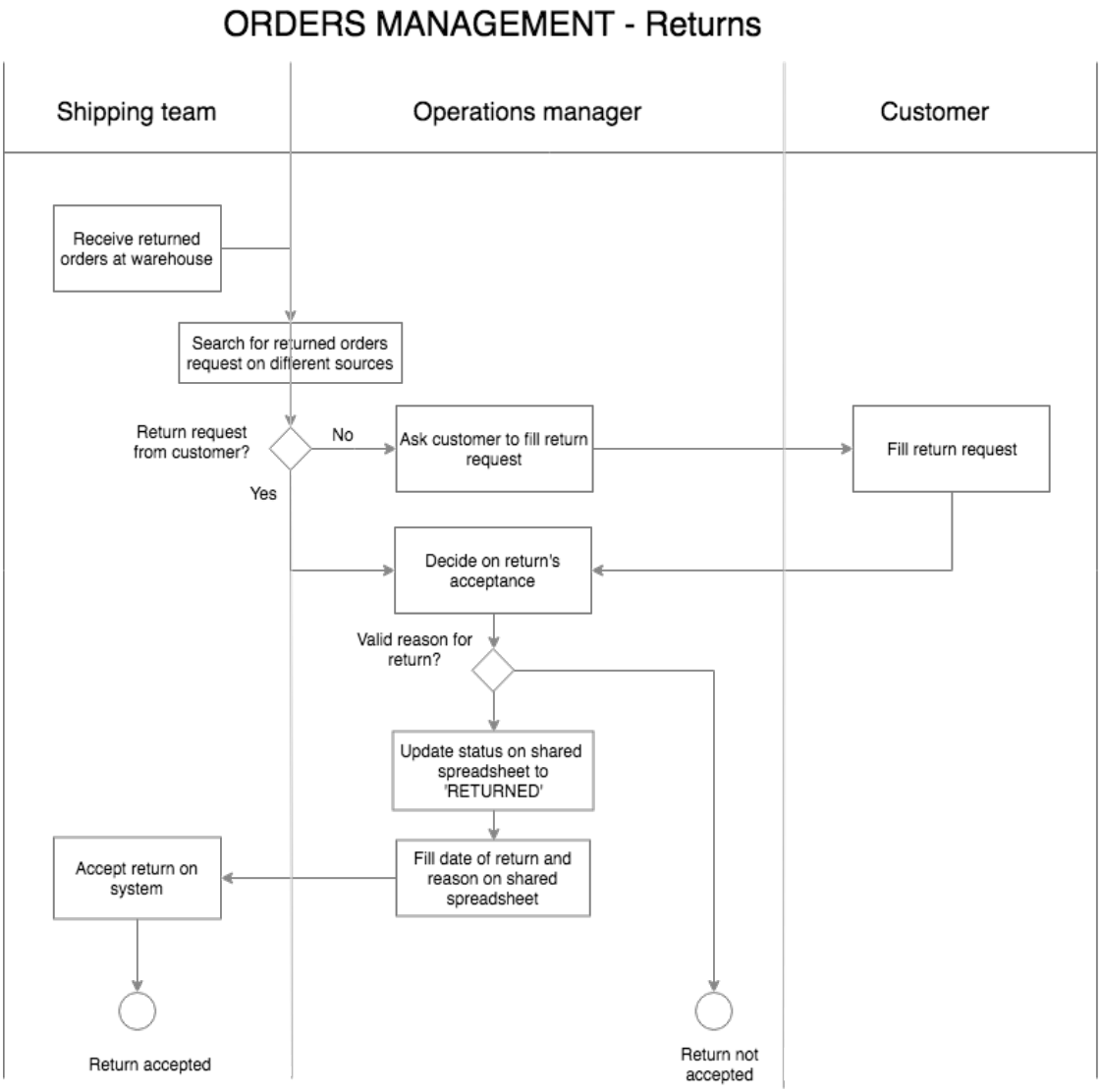


**Figure 10 - Processes 'AS-IS': Orders Management (Returns)**

### 3.4.2 Production Management:

Production: the production of the item in factories passes through cutting, sewing and assembling. Although there are no records on the duration of these three stages, it is known that the bottleneck at this stage of production is related to the time the order stays in the queue (until it starts production) due to the lack of incentive on the part of the factories in producing small-scale articles. The factories end up producing these types of articles at times that are more convenient to them, such as gaps between productions or weekends. This phase is the blur area of the whole process between the order entry and delivery: it is not possible to know if the product is being cut, sewn or assembled, or the expected date for production to be completed. The phase ends as soon as one of the elements of the production team collects the item in the factory or the factory itself ships the item to Platforme International's warehouse.

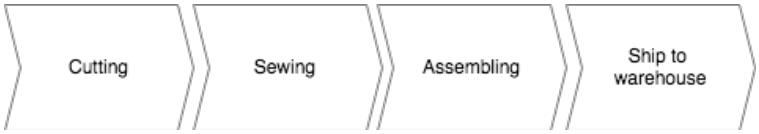


**Figure 11 - Microprocesses of Production Management**

### 3.4.3 Quality Control and Shipping

Quality control and Shipping: At this final stage, a visual quality control is performed by one of the production team members, firstly on the overall quality of the article, then on the conformity between article and production report. If there is a flaw in the article - whether of quality or misinterpretation of the production report - it may entail delays or even force the new production of the article - but if this happens, there is no record of it either on Excel files, in RipeCore, or any other platform. If the quality is approved, one of the members of the production team accesses the shared Excel file to change the status from 'Factory' to 'Ready' and enters the date of arrival of the article into the warehouse. Then, one of the elements of the production team performs the photographic registration of the article for consultation and prevention of future complaints (the pictures are saved on a personal computer and access must be requested to the owner). Finally, the item is ready for shipment, being passed to the shipping department. To ship the article, two documents are needed: Airway Bill (AWB) and sales invoice. For sales through the website Farfetch.com or B&W websites, those documents are made available for download in real time. In other cases, it is necessary to request them from the finance department, providing some details of the sale in question. If the article has exotic skins, shipping will only take place once the requested CITES license has been made available. Once all the mentioned requirements have been verified, the article is sent to the client, a Shipping team member accesses the shared Excel file to change the status of 'Ready' to 'Shipped' and enters the information regarding carrier, tracking number and date of dispatch. Figure 11 represents the ‘AS-IS’ flowchart for Quality control & Shipping process.

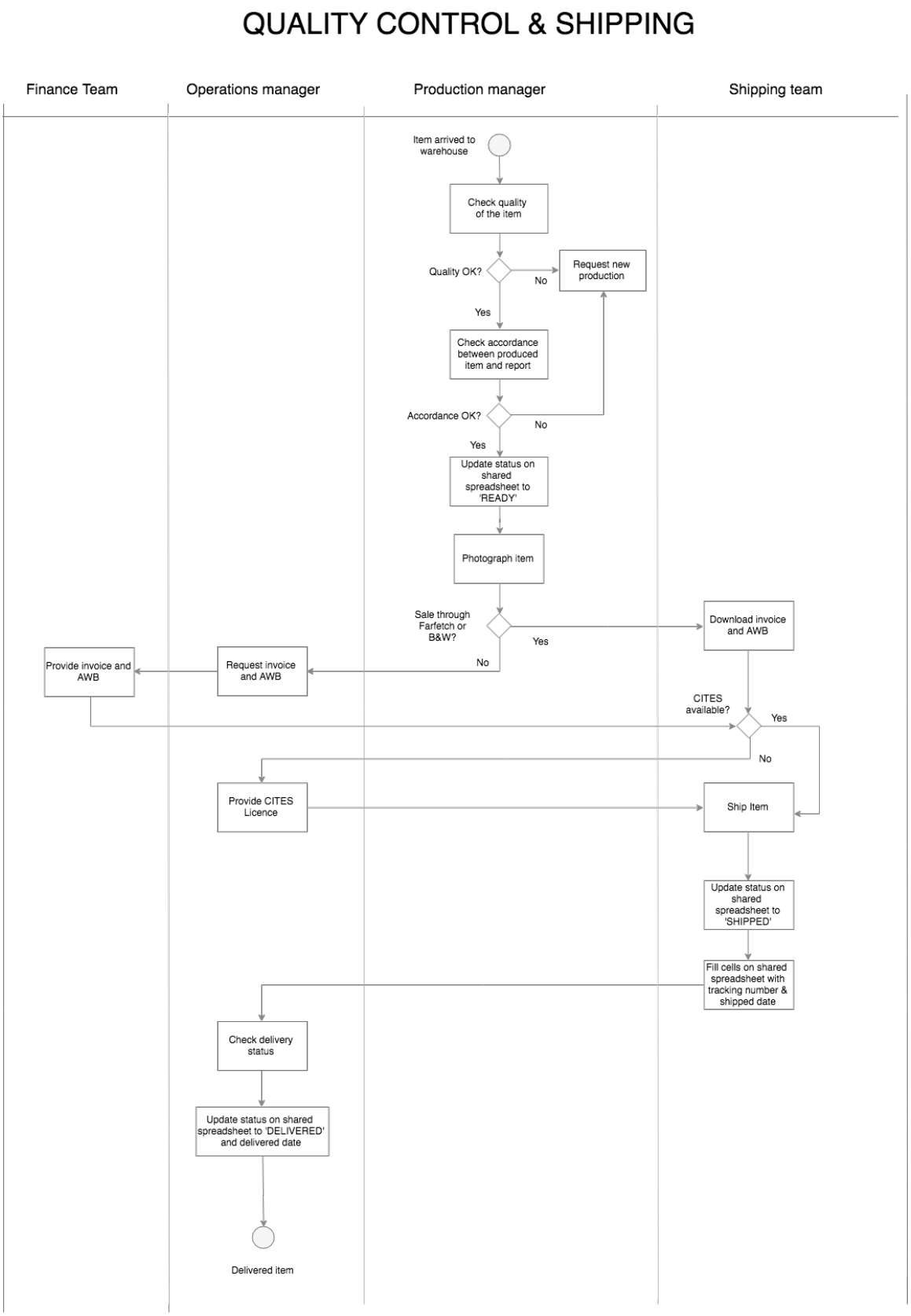


**Figure 12 - Processes 'AS-IS': Quality control & Shipping**

### 3.4.4 Sales Reporting

On a weekly and/or monthly basis, reports are created by the Brand Success Manager to exhibit results from sales per brand, model, channel, or others. The purpose of this activity is to understand how the sales are being affected by marketing activities, brand awareness, etc., and which actions to take based on that history in order to increase sales.

This process is reasonably simple; however, it is based on an inappropriate source of information – a shared spreadsheet document. For that reason, it is reasonable to assume that this process will be improved not on its complexity, but on its quality and the reliability of the information used.

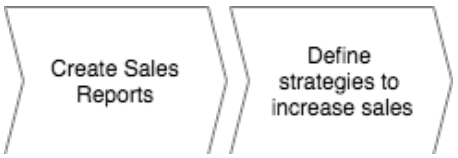


**Figure 13 - Microprocesses of Sales Reporting**

# 4 Analysis and Definition of Requirements

## 4.1 Purpose of RIPE Pulse

As mentioned previously and as shown on Figure 14, the main purpose of designing RIPE Pulse system is to have the possibility to integrate the orders management system in one platform only. This system will allow the automatic import of orders from all channels, the access to details of each order's customization, a real time access to orders status and the restricted access to view and/or edit information through restrictions to data access by user.

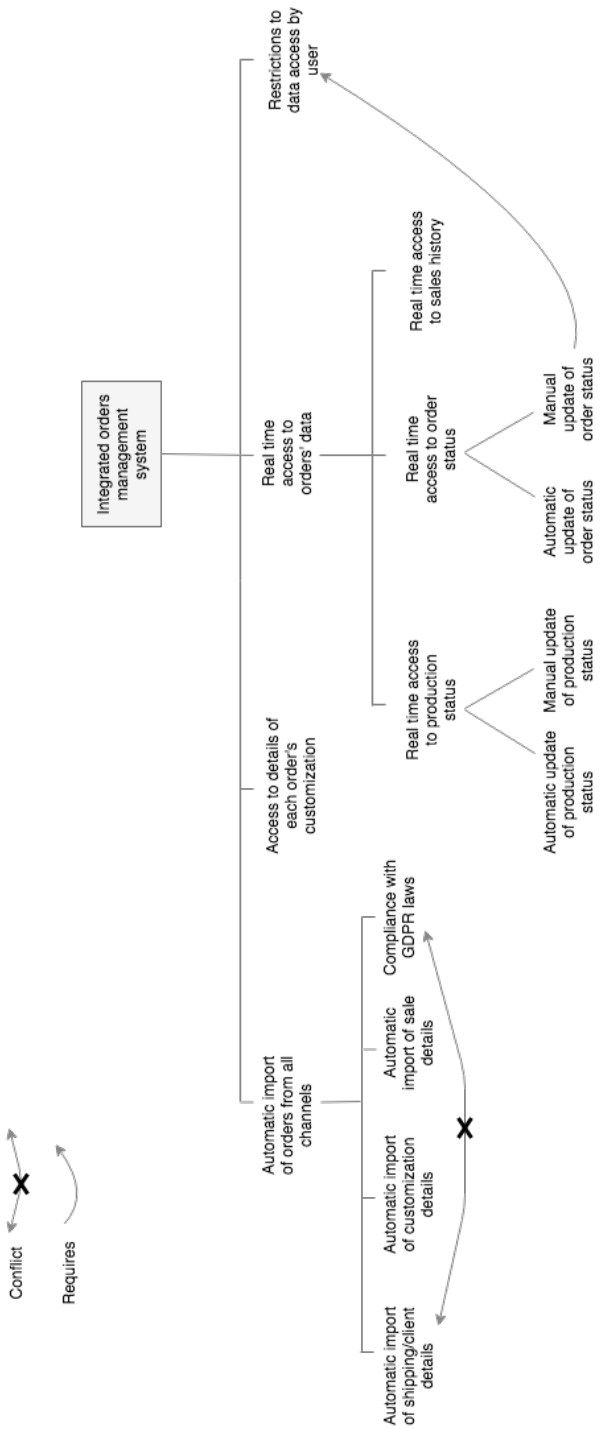


**Figure 14 - And/or diagram of RIPE Pulse software system**

## 4.2 Stakeholders of RIPE Pulse

At this stage of the system design, where only the activities of Orders Management, Production Management, QC& Shipping and Sales Reporting will be considered for the designing of the system (Figure 15), the main stakeholders will be the following:

- Operations manager
- Production manager
- Finance team
- Shipping team
- Brand success manager

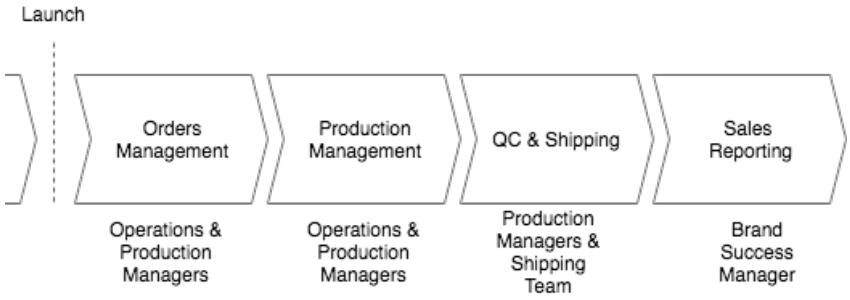


**Figure 15 - Macroprocesses performed after Project launch**

These entities will be, in one hand, the source of several requirements for the new system and, on the other hand, the future users of it. For that reason, they play one of the most important roles during Requirements Engineering process.

## 4.3 Requirements Elicitation

### 4.3.1 Requirements from the existing system(s)

Reusing existing system requirements is one of the most cost-effective and fast ways to elicit requirements for the new system. According to Sawyer & Sommervile (1997), *"experience has shown that for similar systems, up to 80% of the requirements may be more or less the same"*. It also reduces risks since the previous system is already implemented and, therefore, tested.

To have a first general idea of the systems in use, a document was shared with all the employees to gather information about the software systems frequently used by each one of them. The total number of participants was 25:

- 5 from Operations Department;
- 7 from Engineering Department;
- 4 from Finance Department;
- 5 from Production Department;
- 6 from Purchasing Department.

The result of the experience is shown on Table 2 as well as an analysis performed in order to understand:

1) *Is that software system modifiable by Platforme?* This means that the system either belongs/was developed in the company or the company has permission to modify it accordingly to our needs.
2) *Is it possible to integrate that software system with the new system to be developed?* This means that, even if Platforme is not allowed to modify the system, there is the possibility to integrate/link both systems to share information (e.g., through an API).
3) *Is it possible to replace that software system by the new system to be developed?* This means that, even if the two options above are not verified, that software system can be replaced by RIPE Pulse since it will offer the same functionalities or allow accomplishing the same goal.

**Table 2 - Display and analysis of the results of the Requirements Elicitation experience**

| Software | #users | 1) Software modifiable by Platforme? | 2) Possible to integrate by Platforme? | 3) Possible to replace by the new system? |
|---|---|---|---|---|
| **Adobe Illustrator** | 6 | N | N | N |
| **Adobe Photoshop** | 6 | N | N | N |
| **Asana** | 12 | N | N | In part |
| **Dropbox** | 6 | N | Y | In part |
| **Dropbox Paper** | 1 | N | Y | In part |
| **Evernote** | 3 | N | Y | Y |
| **FF Sales** | 7 | N | Y | N |
| **FF Storm** | 7 | N | Y | N |
| **GitHub Projects** | 1 | N | N | In part |
| **Google Drive** | 24 | N | Y | Y |
| **Google Keep** | 4 | N | Y | Y |
| **Google Slides** | 4 | N | Y | Y |
| **Google Spreadsheets** | 24 | N | Y | Y |
| **JOOR** | 6 | N | N | N |
| **Microsoft Office** | 25 | N | N | N |
| **Milanote** | 3 | N | N | In part |
| **Onenote** | 1 | N | N | In part |
| **Primavera** | 1 | N | Y | N |
| **Ripe Core (from client)** | 7 | Y | Y | Y |
| **Ripe Core (from Platforme)** | 6 | Y | Y | Y |
| **SAP** | 9 | N | Y | N |
| **Skype** | 17 | N | N | N |
| **Slack** | 14 | N | N | N |
| **Teamweek** | 1 | N | N | In part |

| | | | | |
|---|---|---|---|---|
| **Trello** | 6 | N | N | In part |
| **Wunderlist** | 1 | N | N | In part |

The software systems above were then classified according to their purpose:

**Table 3 – Requirements Elicitiation: Results sorting according to purpose**

| | |
|---|---|
| **Ripe Core (from Platforme)** | - Database system<br>- Order management system<br>- Operational set-up system (Products, materials, prices, users/accounts, sku's, brands, stores, etc) |
| **Ripe Core (from client)** | |
| **Google Drive** | - Creating, editing, organizing, managing, viewing and sharing documents in the Cloud |
| **Google Spreadsheets** | |
| **Google Slides** | |
| **Google Keep** | |
| **Evernote** | |
| **Dropbox** | |
| **Dropbox Paper** | |
| **Milanote** | - Task Planning / Notes |
| **Teamweek** | |
| **Onenote** | |
| **Trello** | |
| **Wunderlist** | |
| **Asana** | |
| **GitHub Projects** | |
| **FF Storm** | - Sales management tool (from partners) |
| **FF Sales** | |
| **JOOR** | |
| **SAP** | - ERP, billing management software, POS system |
| **Primavera** | |
| **Slack** | - Communication and file-sharing tools |
| **Skype** | |
| **Adobe Photoshop** | - Image manipulation and editing tools |
| **Adobe Illustrator** | |
| **Microsoft Office** | - Creating and Editing Documents |

Taking in consideration the existing systems that have the same or similar purpose to the system do be designed – RIPE Pulse - the following matrix was obtained:

**Table 4 - Requirements Elicitation: Results filtering and analysis**

| SOFTWARE | #users | 1) Software modifiable by Platforme? | 2) Possible to integrate by Platforme? | 3) Possible to replace by the new system? |
|---|---|---|---|---|
| **Ripe Core (from Platforme)** | 6 | Y | Y | Y |
| **Ripe Core (from client)** | 7 | Y | Y | Y |
| **Google Drive** | 24 | N | Y | Y |
| **Google Spreadsheets** | 24 | N | Y | Y |
| **Google Slides** | 4 | N | Y | Y |
| **Google Keep** | 4 | N | Y | Y |
| **Evernote** | 3 | N | Y | Y |
| **Dropbox** | 6 | N | Y | In part |
| **Dropbox Paper** | 1 | N | Y | In part |
| **FF Storm** | 7 | N | Y | N |
| **FF Sales** | 7 | N | Y | N |
| **JOOR** | 6 | N | N | N |
| **SAP** | 9 | N | Y | N |
| **Primavera** | 1 | N | Y | N |

The results obtained led to a concerning signal: the overuse of shared Google Docs, essentially spreadsheets, that stored extremely useful information and, in some cases, represented the most frequently used location of the data. It was relatively easy to understand the reason behind this fact: when asked about it, the employees referred that they find it difficult to look for data in the several existing sources, and for that reason they tend to create their own spreadsheets. By doing that, they have the possibility to gather the information they need in one single place, and they can adapt the file accordingly to their needs (which data to present, how to represent it, who can modify the data in that document, etc).

In order to understand how these shared spreadsheets could serve as a source of requirements, a detailed analysis was performed to understand which spreadsheets were crucial to the previously defined processes; what was the content of those particular spreadsheets, who created, managed and/or has the privilege to edit them. The results obtained were the following:

- Swear Orders Report: contains information about all SWEAR sales, for all the channels and with a high level of detail. It is the only source of information where all the data regarding Swear sales is gathered (see Figure 7). It is filled by hand, and for that reason may contain several errors. It was created by a former employee on September 2017, it is shared with 24 users and 11 people are allowed to edit it.

- Platforme Orders Report: contains information about all sales for the other brands, for all the channels and with a high level of detail. It is the only source of information where all the data regarding the sales for other brands is gathered. It is filled by hand, and for that reason may contain several errors. It was created by a former employee on September 2017, it is shared with 21 users and 14 people are allowed to edit it.

- CITES Management: contains information about the status of all CITES License requirements, and serves as the source of information for the staff member responsible for requesting the license. It was created on February 2018, it is shared with 11 users and 9 people are allowed to edit it.

- SWEAR Stock – contains information about the stock of SWEAR's products that are ready to sell. This file was created after the user had bad experiences with the SAP system, finding it very complex and not user-friendly. It was created on February 2018, it is shared with 18 users and 1 person is allowed to edit it.

In spite of the concerning scenario found during the exercise, the positive side is the fact that the shared Google Spreadsheets can be easily replaced by the future software system RIPE Pulse and – even more positive – several requirements from the users are directly exposed in these documents.

### 4.3.2 Requirements from stakeholders

Taking in consideration that stakeholders represent those who will benefit, directly or indirectly, from the system to be developed, they are a crucial piece in the requirements elicitation process as they can not only indicate existing needs, but also constraints on the system; stakeholders' participation on this step is also a good opportunity to make them feel that they are a part of the project so they will be more likely to volunteer. According to Sawyer & Sommervile (1997), several aspects must be considered when eliciting requirements:

- Often, stakeholders do not know what they want, or have difficulty expressing it clearly;
- There is always a possibility to find conflicts between stakeholders ' requirements - but also commonalities;
- It is extremely important to understand the functions of the stakeholders in the organization, so as to ensure a correct interpretation of their requirements;
- The requirements expressed by stakeholders may be influenced by interests of various kinds;
- The requirements are not immutable, nor the stakeholders – the dynamics of the organization may require a reassessment of stakeholders, as well as the validity of requirements or need for new ones.

Due to the scope of the dissertation, the elicitation was limited to the elements that were directly related to the activities after the project delivery – Orders Management, Production Management, Quality Control & Shipping and Sales Reporting – namely: Operations manager; Production managers; Shipping team; Finance Team and Brand success manager.

The interviews performed as explained in Chapter 3 were valuable in order to identify the stakeholders' needs for the future information system. The personal nature of this activity allowed the easy understanding of what currently displeased the staff, as well as how the current scenario could be improved with the new system to be developed. This requirements discovery

was not only guided by the stakeholders' response to the 'what do you need?' question, but also by the analysis of the organization as a whole, the domain of application of the future system and how it will be used.

### 4.3.3 Requirements from documentation

One of the major obstacles found when looking for requirements in existing documentation was the fact that, with the rapid growth of the company, the existing procedures manuals were mostly outdated.

However, at the beginning of this project, certain manuals were created by the author with the purpose of updating the existing ones and also creating new ones that were needed. They explained mostly how the several spreadsheets were used and filled. These manuals were created independently of the purpose of the dissertation, and only for the need to have procedural guides for new elements that integrated the company.

These procedures manuals have been used by various elements of the company and are still a source of information for those who have just joined or even those who belong to the company for longer time. For that reason, these Procedure Manuals were used in the stage of finding requirements from existing documentation.

## 4.4 Requirements Negotiation

The requirements negotiation stage featured higher simplicity than the previous stage, due to the contained nature of the RIPE Core system. There were no conflicts between stakeholder’s needs/requirements – there were few stakeholders involved with similar interests, which may have avoided possible interest conflicts.

However, it was possible to understand that some of the stakeholders did not understand the limits of the tool, since they did not understand its technological part. For that reason, some of the requirements proposed were rejected due to not being feasible, and the motive was explained to the stakeholders.

An information conflict has also been identified, as the future system cannot contain immediately all the information from the past. The only source of detailed information (shared excel spreadsheets) is unreliable, so the sales history it contained will not be transferred to the new system without first being validated (to be carried out after the definition of a method for validation).

## 4.5 Requirements Documentation

The requirements documentation for system RIPE Pulse was developed having in consideration those who will read and use it - the software development team. For that reason, the requirements resulting from the steps mentioned above were documented in a Software Requirements Specification document (SRS) which can be found in APENDIX A.

# 5 Developed solution and Solution prototyping

As previously mentioned, the suggested solution is an information system - RIPE Pulse - that will allow the centralization of information, reduce the risk of using incorrect data associated with human error and filtering access to information by different users.

## 5.1 RIPE Pulse Mock-ups

After the requirements were defined, mockups of the future RIPE Pulse information system were developed.

Since the structure of the SRS document contains a chapter related to mockups of the system to be implemented, the two contents converge into one only, and for this reason, the mockups of the new system can be viewed in APENDIX A, Software Requirements Specification - Chapter 3.

## 5.2 Processes TO-BE at Platforme International

Process innovation must begin with an overall listing of processes to identify the ones that are candidates for improvement. Davenport distinguishes five key activities in identifying this list of processes: Enumerate major processes; Determine process boundaries; Assess strategic relevance of each process; Render high-level judgments of the 'health' of each project; Qualify the culture and politics of each process.

The understanding of the processes AS-IS represented a crucial starting point for modelling of the processes TO-BE: once one identifies how the processes are and maps them, one can analyze the current scenario and propose certain improvements.

Having the requirements of the new RIPE Pulse system well-defined is also an important aspect, considering that this project aims for processes improvement through the implementation of the new information system. For this, a systematic analysis of the current processes was made in order to find possible improvement points, reducing their complexity and standardizing them as much as possible.

In the following images it is possible to observe the proposal of the new processes in flowchart format, with reduced levels of complexity after the RIPE Pulse solution was implemented, as well as an explanation of the improvements achieved in each one of them.

### 5.2.1 Improvements on Orders Management Process

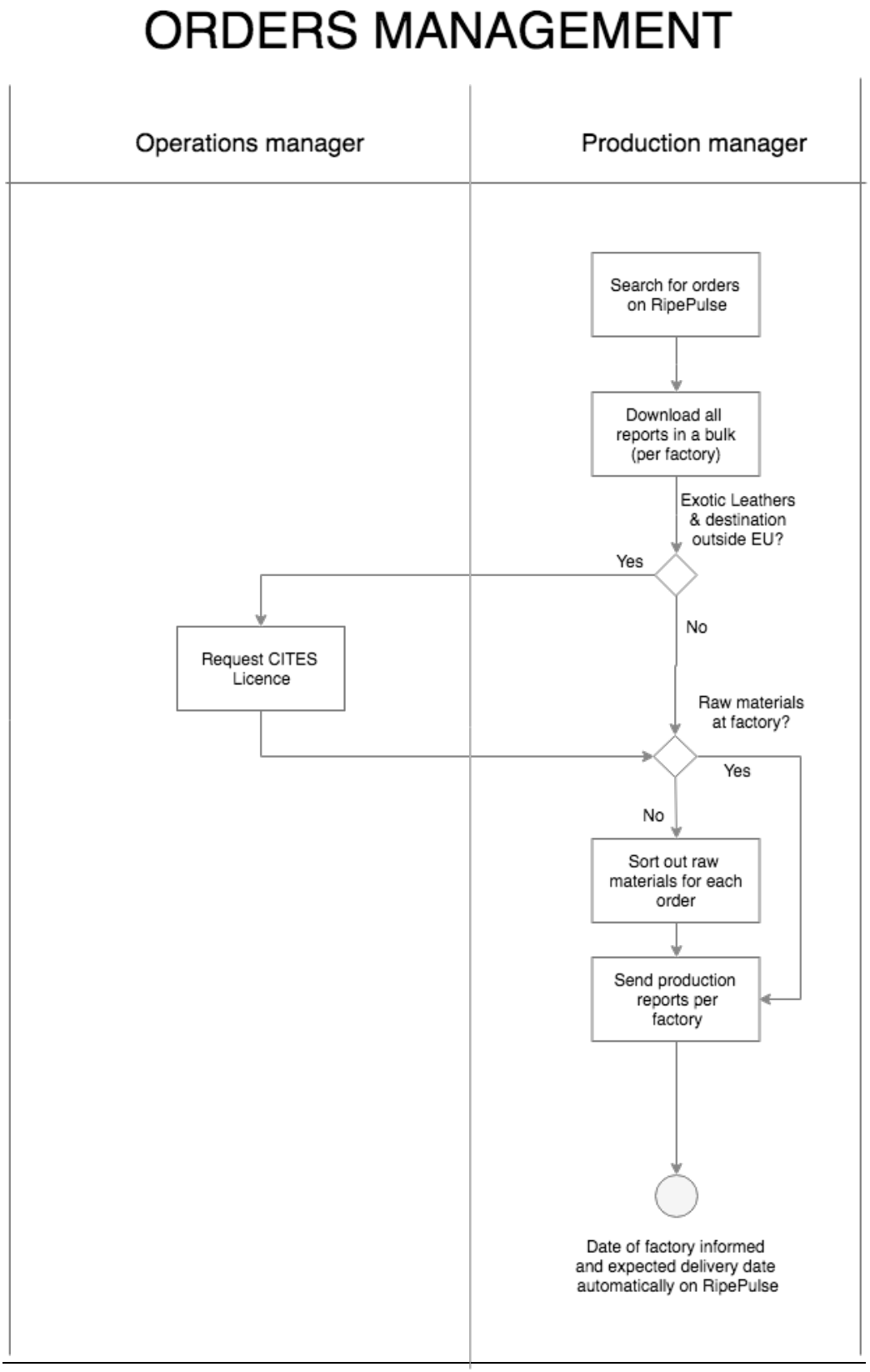


**Figure 16 - Processes 'TO BE': Orders Management**

- The Production Manager has total independence throughout the process. In the case of the order requiring CITES license, an automatic email is sent to the Operations Manager in order to alert for the need to request the license. After the license is provided, the Operations Manager is able to change the status of the license requirement on RIPE Pulse so the actors in the downstream steps are aware of the update.
- There is no need to search for new orders on different sources. RIPE Pulse will be integrated with all the different channel solutions and import the details of the orders automatically. Obviously, there is also no need to waste time filling the spreadsheet.
- There will be a log of activities and status of each order. Every time there is an update on the order status, the system will register the change and the users will be able to check the history of the order, with respective dates, status and who registered the modifications.
- The production reports will be downloaded by brand and/or factory. With this improvement, there is no need for the Operations Manager to download the orders one by one and separate them manually later.

### 5.2.2 Improvements on Cancelations Process

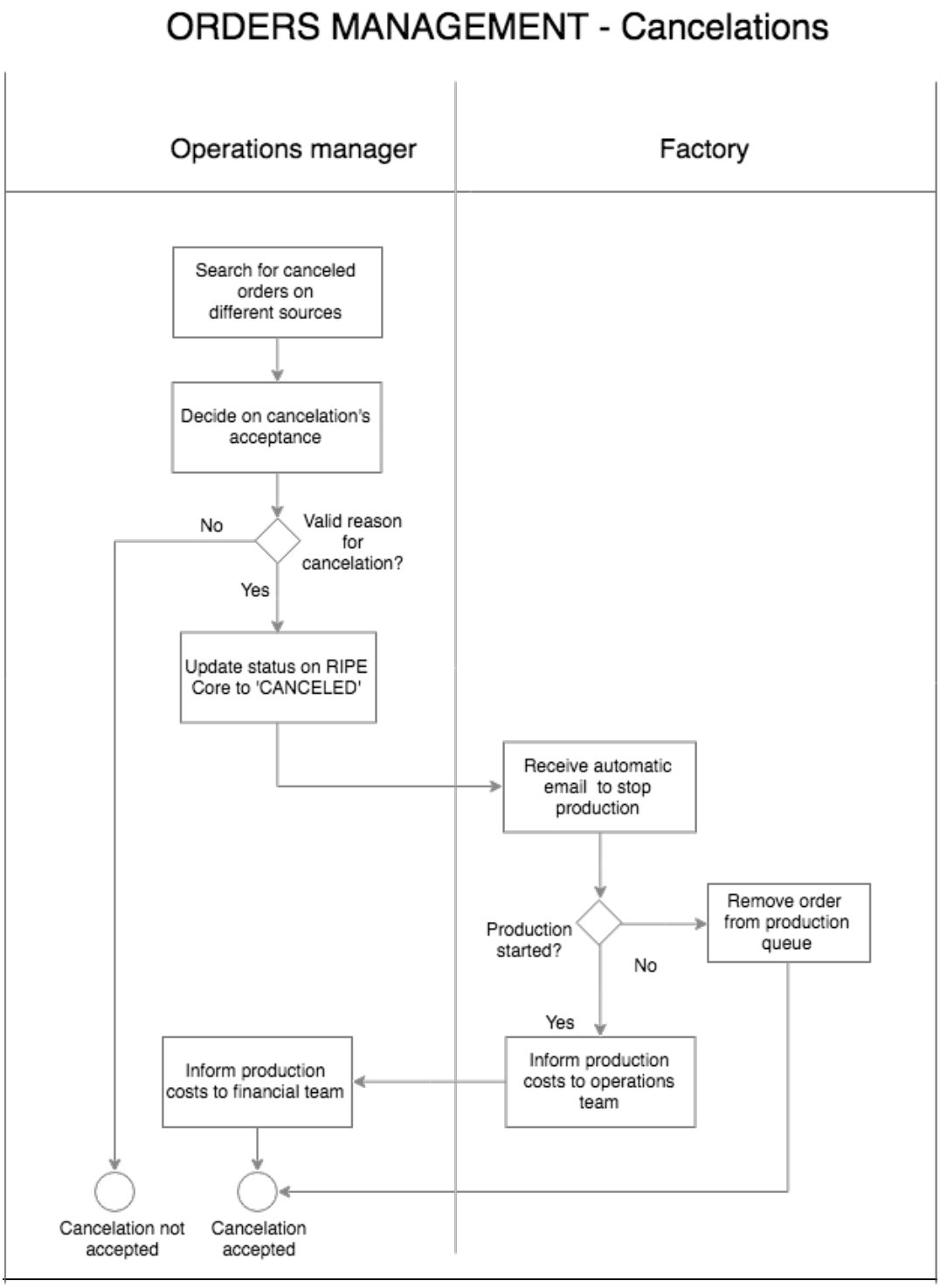


**Figure 17 - Processes 'TO BE': Orders Management (Cancelations)**

- The back and forth of emails in order to alert the factory to the cancelation is reduced. In the moment that the Operations Manager marks an order as ‘canceled’ on RIPE Pulse, an automatic email is sent to the factory notifying it to stop the production. The factory

is responsible for later informing of any production costs if the production had already started.

- There will be a log of activities and status of each order. Every time there is an update to the order status, the system will register the change and the users will be able to check the history of the order, with respective dates, status and who registered the modifications.

### 5.2.3 Improvements on Returns Process

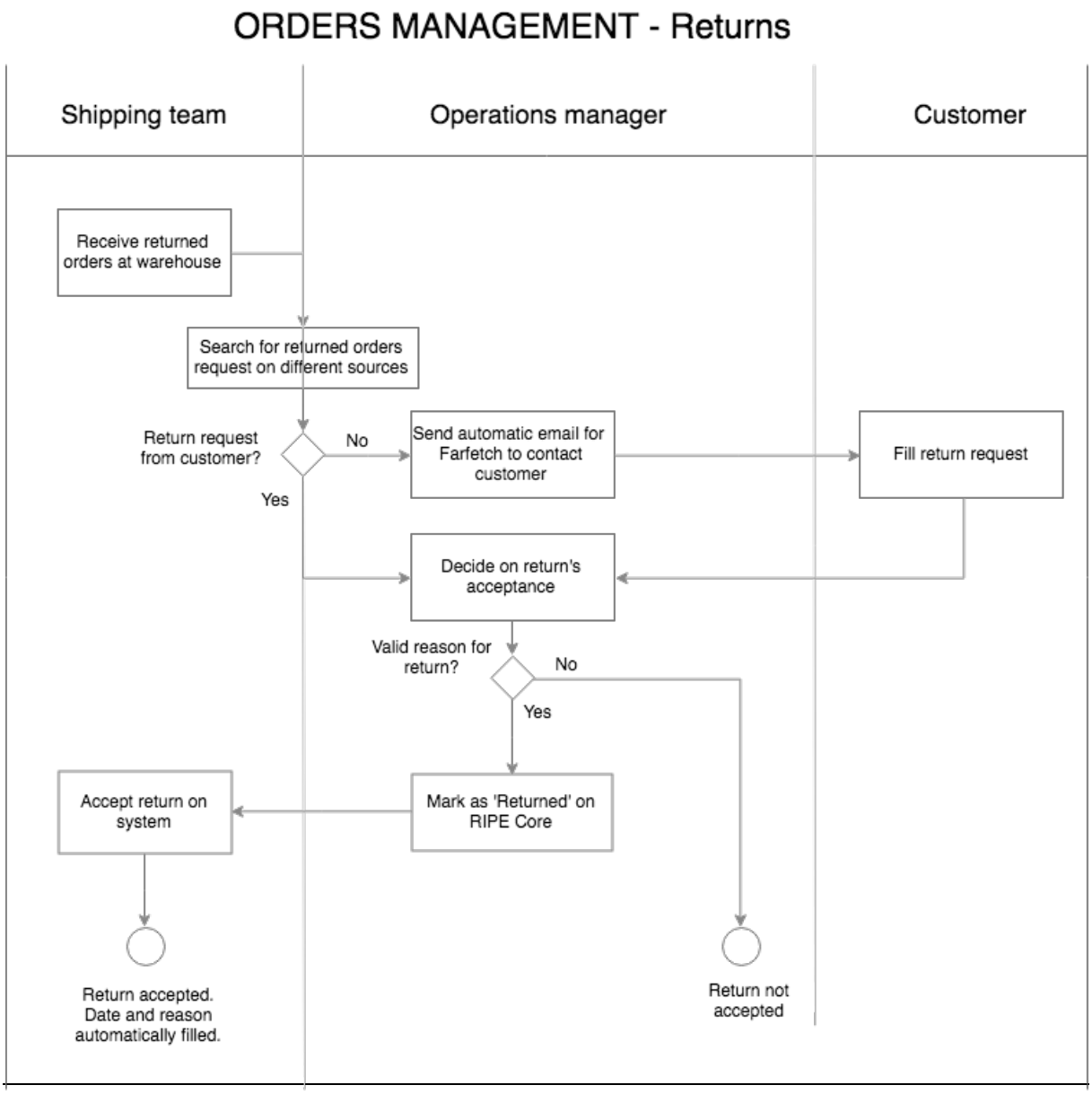


**Figure 18 - Processes 'TO BE': Orders Management (Returns)**

- Through the integration of the shipping companies' tracking solutions on RIPE Pulse, the location of the returned item will be constantly available and there will be no need for repeated communication through alternative channels between the Shipping Team and the Operations Manager.

- The clear visibility of both the return request status and the returned item's location will allow a faster management of the returns, avoiding delays on the process that currently cause expressive customer dissatisfaction.

### 5.2.4 Improvements on QC & Delivery Process

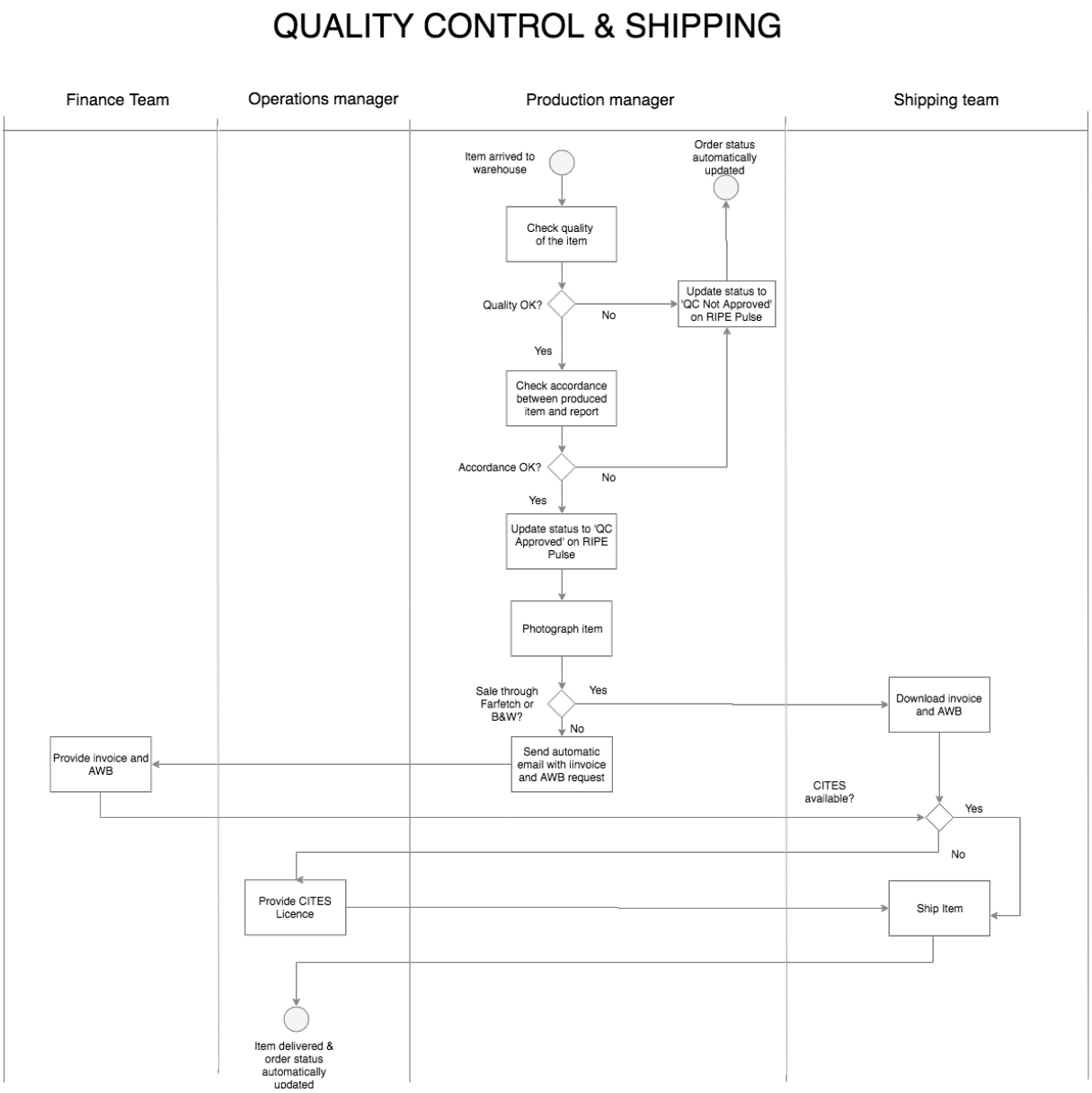


**Figure 19 - Processes 'TO BE': Quality Control & Shipping**

- Through the integration of the shipping companies' tracking solutions on RIPE Pulse, the location of the item will be constantly available and the status of the order will be automatically updated to 'Delivered' when the order is received by the customer, as well as the delivered date.
- The photographic record of the item will be available on RIPE Pulse for future usage, instead of remaining under the control of only one person.

- There will be no lack of information when the item is rejected during quality control. All the actors are aware of the result of the quality control activity: if the item is approved, the status of the order will be changed to 'QC Approved' and the photographic registration will be done; if not, the status of the order will be changed to 'QC Not Approved' and the Operations Manager will communicate the procedure to take in each particular case.
- The biggest improvement builds on the steps after the shipping: there is no need to take any action nor update any status, as the integration with the shipping companies' tracking solutions will allow an automatic update of the status and the delivery date.

### 5.2.5 Improvements on Sales Reporting Process

As referred on Chapter 3, the process of Sales Reporting did not suffer an improvement on its complexity, but on the quality and reliability of the information used in its scope. The reports delivered to the brands will be based on trustworthy data and with the desired level of detail.

The biggest achievement however will build on the automatization of the reports, that are currently created manually, based on formulas that are fed by the shared spreadsheet. Therefore, the Brand Success Manager will no longer face the risk of delivering incorrect data to the brands, and will also be able to spend more time focusing on strategies to improve sales based on the results.

## 6 Conclusion and future research

The main objective of this project was to design a new software system that would allow the improvement of processes in the company. The relevance of this project was extremely high in the stage of maturity in which the company was, since there was an urgent need to reformulate processes and improve the quality of information used.

The initial phase of collecting information for the purpose of designing the AS-IS Processes was particularly important as it provided an overview of the state of current activities, which until now represented a gray spot in the company. At the end of this phase, the company started to have clear information about the current processes, a necessary part for the following steps: having a 'photograph' of the current state is essential for any improvement to be applied in the future.

The next step of analysis and definition of requirements was also important in that it gave voice to those who felt the greatest frustration with current processes. The employees' sense of collaboration (with the goal of helping to improve the current state of the processes) was highly motivating and served to rekindle the importance of the work being developed.

Finally, presented the design of the new RIPE Pulse software system and the restructured processes, it is possible to verify that the requirements raised were considered and that the initial objective was then fulfilled. Since the project in question is limited to the design of the RIPE Pulse solution for its future implementation, obtaining conclusive results on its benefits is limited. Thus, since it is not possible to directly measure the improvements achieved with the project in question, the metric considered was the feedback obtained from the stakeholders of the future system. Once the mockups of the future system were presented, as well as the redesigned processes, the feedback from its future users was very positive, noting an urgent desire to change to the new system.

As a future work, two essential ideas emerge: the first one naturally passes through the implementation of RIPE Pulse in the company and, consequently, in the new processes. The second would be an expansion of the RIPE Pulse system to the remaining activities carried out in the company. As mentioned in Chapter 3, the nature of this project did not allow for the comprehensiveness of all activities, but there is a clear need to include them in the future software system so that the processes related to these activities can also be improved.

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# APPENDIX A: Software Requirements Specification (in separate volume)