MESG

MESTRADO EM ENGENHARIA DE SERVIÇOS E GESTÃO

Freight forward activity optimization through a TMS strategy review

Assane Jamú Sidi

Master Thesis

Supervisor at FEUP: Professor Alcibíades Guedes

Supervisor at RANGEL: Engineer Miguel Cordeiro

U.PORTO

FEUP FACULDADE DE ENGENHARIA
UNIVERSIDADE DO PORTO

2018-07-01

To my grandmother Kulssum …

Abstract

Freight forward activity is centred in managing information flows. Activity that is under constant innovation, and the Transport Management System (TMS) used to perform shipments have an important role on the support of this activity for commercials, operatives and the board members. Despite the constant innovation, in Portugal freight forwarders still base their activities in manual tasks and in paper usage.

INFORTRANS is the current TMS used by RANGEL (developed internally by the Information Technology department - DSI) to support the shipment preparation process. This system was created in 1990 with a reality of road, sea and air freight being operated all in the same company. In the same year, RIAM's board decided to separate air and sea freight from road freight, resulting in the creation of two separate companies. INFORTRANS was then adapted to be used in both companies supporting their activities.

Due to the need of having a better information technology support (providing integrations and increased productivity of the operatives through automatisms and digitization) company´s board decides to conduct a strategy review over the current TMS and study the possibility of implementing an external solution that provides a better support to their strategic and operational goals. This review aims to increase the productivity, and mapping the processes was a crucial activity to ensure the suitable implementation of a future TMS. The mapping was done in an AS IS – TO BE approach, optimizing and uniformizing the processes from the AS IS to the TO BE. On the TO BE version of the processes, automatisms and digitization trends have been included and deeply recommended. Not only to ensure the increase of productivity but also to have a more environmental friendly company.

All this data is related to the decision support analysis and has been considered and calculated, which all summed up with the recommendation for a new TMS implementation. With it, came the possibility of deciding between two main strategies: Adjust the capacity to the actual business volume (diminishing costs) or increase capacity (and win market share). This project has presented results for both options but since the company's expectations are leaning towards increasing capacity extra data was only presented for this option.

Having the future in mind, vital recommendations have been considered to ensure that the TO BE process can be successfully implemented (and results maximized) and future developments as the displacement of activities, workflows definition and blockchain concepts incorporation, have been suggested.

Acknowledgments

Having present that this is much more than an individual work, I would like to express my profund gratitute to:

My family, despite the distance particularly to my parents without whom my academic formation in Portugal would be impossible and to my friends, for the words of encouragement and support during this phase of my academic education.

Alcibíades Paulo Guedes, FEUP professor and my supervisor at FEUP, for all the support and recommendations during this project.

Miguel Cordeiro, IT country manager at RANGEL Invest (my company supervisor) for all the advice, friendship and support during my internship.

Mário Silva, RIAM country manager at RANGEL Invest, for all the availability, advice, support, confidence placed on me and mainly for the friendship.

All the RIAM team, particularly to: Pedro Casqueira and Renata Bessa, for the support and friendship.

All the IT team, particularly to: Catarina Almeida, Marco Brito and Sergio Costa, for the support and friendship during this time on the same open space.

My internship colleges (João Coutinho, Nuno Pinto and Ricardo Moço) and HR interns responsible, Rita Castro, to all the support and tips.

For RANGEL in general, my sincerely gratitude for the support during the dissertation.

At last to BCP foundation, for the scholarship support during my master.

Table of Contents

List of Tables

List of Figures

List of abbreviations

3PL - Third-party logistics

4PL - Fourth party-logistics

ARC - Boarding certificate for Angola

ATA/D- Actual Time of Arrival/Departure

B/L – Bill of Landing

B2B – Business to Business

BKD – Booking confirmed

CHAMP – Air cargo community portal

COB – Confirmed on Board

DAF – Administrative and financial department of RANGEL

DAP – Delivered At Place (Incoterm)

DDP – Delivered Duty Paid (Incoterm)

DFD – Data flow diagram

DLT – Digital Ledger Technology

DLV - Delivered

DOX - Documents

DSI – Informatic systems department of RANGEL

e-AWB – Electronic Air Way Bill

ETA/D – Estimated Time of Arrival/Departure

FCL – Full Container Loading

FRD – Freight Receive Date

FTE – Full time - equivalent

GDPR – General Data Protection Regulation

GP – Gross Profit

IT – Information technology

INTTRA – Ocean shipping network

LCL – Less Container Loading

LOC – Loaded on container

MSC - Mediterranean Shipping Company

PI – Performance indicador

PO – Purchase order

POD – Prof of delivery

RAET – Rangel Angola Expresso e Trânsitos

RI – Result indicator

RIAM – Rangel Internacional Aérea e Marítima

RLB- Rangel Logística Brasil

RLCV – Rangel Logística Cabo Verde

RMLT – Rangel Moçambique Logística e Trânsitos

RT – Rangel transitários

SAP – Enterprise management software

TEUS – Twenty Foot Equivalent Unit

TMS – Transport Management System

TSF – Transferred for Shipper

VGM- Verified gross weight

WAVERS- Boarding certificate

1 Introduction

Freight forward activity is an activity in constant transformation, mainly due to technological evolution. A freight forwarder is an agent specialized in arranging storage and preparing shipping on behalf of its customers/agents. It usually provides a full range of services including: tracking inland transportation, preparation of shipping and export/import documents, warehousing, booking cargo space, negotiating freight charges, freight consolidation, cargo insurance, and filling of insurance claims. Freight forwarders usually ship under their own bills of landing or air waybills (called house bill of landing or house air waybill) and their agents or associates at the destination (overseas freight forwarders) provide document delivery, deconsolidation, and freight collection services. (Business dictionary definition).

In our days, regarding integrated logistics there are 3PL's (third-party logistics), which consists in an arrangement in which a firm with a long and varied supply chain outsources its logistical operations to one or more specialist firms, the third party logistics providers, and 4PL's (fourth party-logistics) an arrangement in which a firm outsources it's logistical operations to two or more specialist firms - third party logistics - and hires another specialist firm - fourth party logistics - to coordinate the activities of the third parties. (Business dictionary definition) On this context, RANGEL is trying to evolve from a freight forwarder and a 3PL agent in consolidation, to a 4PL.

This project is based at RIAM (Rangel Internacional Aérea e Marítima), one of the companies of the RANGEL INVEST holding. Regarding the strategy review of the TMS (Transport Management System) in usage, to define the best TMS to use in the future.

1.1 RANGEL

RANGEL INVEST emerged from the creation of the custom brokers Eduardo Rangel in 1980, time where the company was only dedicated to the customs broker business. The air and sea freight business have emerged in 1991, joined with road freight, same year when the company decide to expand geographically in Portugal to Lisbon, Leiria and Aveiro. In 1999, RANGEL decided to separate the freight forwarder company of the group in two, separating the road freight (RT) and another for air and sea freight (RIAM). Nowadays Rangel is a company with 11 sub-companies on the holding (figure 1 below) with presence and offices in four more countries: Angola, Brazil, Cape Verde and Mozambique.

All the companies of the holding are served with a corporate center where they share financial, marketing, human resources, quality, legal, management control and information technology services. This corporate center has emerged in 2000 in Porto, due to the increase in the number of companies of the group, with the decision of separating the distinct business areas of the company in different companies by creating an holding. This holding with various companies, each one with different business characteristics constitutes a challenge to the corporate center in terms of dealing with the needs of the different business lines.

Figure 1 - RANGEL Holding (Source: Rangel website)

1.2 RIAM: Rangel Internacional Aéreo e Marítimo

RIAM, is a company from the RANGEL Invest Holding focused on the air and sea freight forwarder activity from/to all over the world.

With main facilities and office in Portugal, RIAM through Rangel is present in four more countries: Angola (since 2006 with RAET - Rangel Angola Expresso e Trânsitos), Brazil (since 2013 with RLB- Rangel Logística Brasil), Cape Verde (since 2015 with RLCV - Rangel Logística Cabo Verde) and Mozambique (since 2011 with RMLT - Rangel Moçambique Logística e Trânsitos). In Portugal is splitted in Lisbon and Oporto (headquarters), with Lisbon RIAM having their own warehouse and Porto using the RT (another company from the group) warehouse. Figure 2 illustrates the countries where RIAM is represented.

In 2017, RIAM had transported 15229 TEUs - Twenty Feet Equivalent Unit of containers (22.6% of the Portuguese Islands) and 2 078 Tons of air cargo. With a total revenue of 25.6M Euros (73% of them from sea freight and 24,5% of them from air freight), 60.3% of the air freight revenues are from transactions with countries where Rangel is geographically represented and 63.7% of the sea freight revenues also from transactions with countries where Rangel is geographically represented, with Angola as the main market for both air and sea freight.

On the other countries where Rangel is not directly represented, it is noteworthy the revenues from transactions with China (8.7% on air freight and 11.6% on sea freight), followed by USA (4.4% on air freight and 2.2% on sea freight).

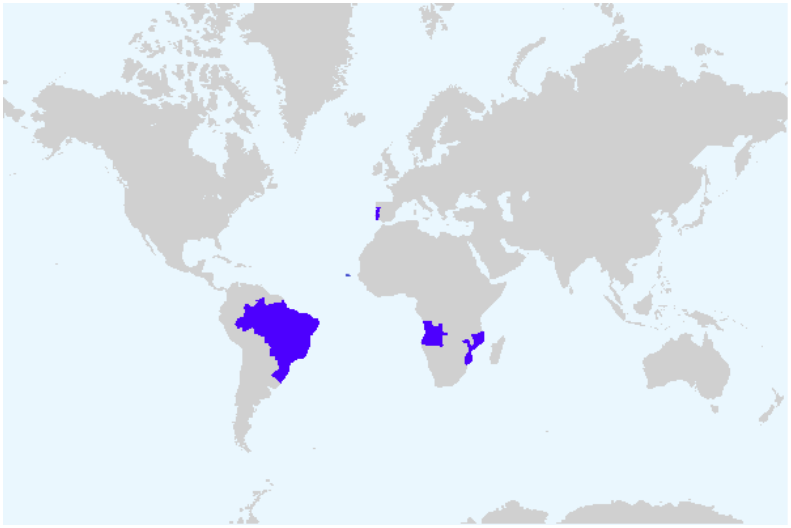


Figure 2 - Countries where RIAM is represented

In our days, transport is more than take something from point A to point B. It is about transporting information and being a partner to the clients on their value chain. Currently RIAM is a freight forwarder offering transportation services (sea or air) but must have the ambitious to become the clients partner on the value creation process.

The current information technology system of RIAM is INFORTRANS, and it is used on all the locations where RIAM is. INFORTRANS, is integrated with the freight offer, SAP CRM, RIWARE (RIAM Warehouse), open credit, credit disinhibition, invoices portal, file control, billflow, Qlikview and open reports, to ensure the Information Technology (IT) support to all tasks to be performed.

1.3 The project and the TMS: Transport management solution

The TMS strategy review has been based on the mapping of the processes for RIAM. All the mapping activity emerged on the needing of having uniform processes and on a context of selecting a new TMS.

A conceptual model of business processes is deployed on a large scale to facilitate the development of software that supports the business processes, and to allow the analysis and re-engineering or improvement to them (Aguilar-Savén 2004) In this sense, models used to analyse business processes for developing software should include expert judgments and heuristics, measurements, formality and be executable (Aguila-Savén 2004, citing Phalp 1998). According to that, it is important to establish the integrations (with SAP) and measure estimations of gains with a TMS implementation.

The relation between the mapping activity and the TMS is developed involving three dimensions: tasks, information and collaboration. These three dimensions are always involved and supported by the organizational culture of the company. The software includes the three dimensions: tasks and information directly connected to the TMS and the collaboration with indirect effect over the usage.

The tasks, defining the activities on the process, information defining the documents and information flows that occur by which activities, and collaboration on a perspective of the

responsibilities of each department. The organizational culture will affect the company crosswise with the values and norms that support these three dimensions.

The business model canvas has been used as an important tool to understand the new opportunities and summarize the changes after the strategy review on RIAM.

1.4 Motivation for this project

The strategic review of the TMS is an old issue inside RIAM and RANGEL Invest. This process has been addressed before, but this time around it is being tackled together with the processes mapping activity, guaranteeing that the processes are mapped and analysed according to people's needs as well as the company goals. This will serve as guidance and will help in supporting the company's competitive advantages.

Productivity, process standardization and strategic alignment can be considered the main motivations for this project.

- Productivity – Increasing productivity, in the TO BE process, optimization of the process that will be used as the base to the TMS definition.
- Process Standardization – Uniformization of each type of process inside RIAM, with an AS IS-TO BE approach to understand the different ways of preparing a shipment but considering the best flow to do it - Resulting in a process-based company.
- Strategic alignment – Reaching new markets and workflows according to those markets expectations and needs - Recommendations on the TMS implementation, with special attention to the organizational culture.

1.5 Problem definition

Every operative of RIAM has its own way of performing a shipment preparation process almost without any support from the IT tool available (INFORTRANS). The lack of process standardization and process optimization/improvement represents a major loss of productivity at RIAM.

INFORTRANS system have been adapted from the road freight to the Air and Sea freight business, and this adaptation has been done without having in mind much of the specific needs of both types of freight (Air and Sea). Therefore, RIAM needs to innovate, adapt and improve the IT tool that supports the shipment process preparation.

On top of these two key problem areas the need of having a TMS that integrates with external entities and software's (issue that led RIAM board to decide for an external solution) needs to be addressed.

1.6 Dissertation structure

This dissertation report is composed by 7 chapters: Introduction, theoretical framework, project contextualization, methodology, processes mapping and optimization, transport management system, conclusions and future developments.

Introduction, that includes the company's presentation, TMS concept and the motivation for this project.

Theoretical framework divided in: optimization and digitization (2.1), mapping (2.2), Transport Management System - TMS (2.3), leading change and organizational culture (2.4), business model canvas (2.5), and performance management, dashboards and track and trace (2.6).

Methodology, presenting the research design and method considered and chosen for the project.

Processes mapping and optimization, with an explanation for the method of mapping and the results obtained with the mapping process (presented as a use case).

Transport management system, with the features and the result of the analysis of the needs and implementation process of the TMS. This chapter is divided in 10 sub-chapters with general information about the TMS and a measurement sub-chapter of the potential benefits (6.6), divided in: productivity, reducing costs, increasing business volume and purchase orders and provisions.

Conclusion and future developments, a chapter with a sum up of the mapping process and the strategy review of the TMS, and the importance they present to the whole process implementation. In terms of future developments, there are have been presented proposals of activities to be performed to facilitate the implementation activity.

2 Theoretical Framework

2.1 Optimization and digitization

The optimization activity is based on business processes modelling, and business processes are defined as a set of one or more linked procedures or activities executed following a predefined order which collectively realize a business objective or policy goal, normally within the context of an organizational structure defining functional role or relationships (Chinosi and Trombetta 2012). The business process modelling activity enables a common understanding and analysis of the company business process (Aguilar-Savén 2004).

The processes optimization has been done in a AS IS – TO BE model, with special focus on digitization and having present that according to Markovitch and Willmott (2014), successful digitization efforts start by designing the future state for each process without regard for current constraints. Once a compelling future state has been described, constraints (for instance, legally required checks) can be reintroduced. Companies should not hesitate to challenge each constraint.

Having present processes-based companies, digitization has also a crucial role. According to Lai, Wong, and Cheng (2010), digitization of logistic activities refers to the application of Information Technologies to enhance the performance of logistics activities and digitized logistics activities is crucial for cost-effective logistics management. The assumption of the separability of IT applications for logistics activities ignores the collective benefits of digitization. This means that on a paperless company perspective, bundling digitized logistics becomes vital to maximize the benefits of digitization.

2.2 Mapping

Regarding the mapping of the business processes many models could be considered, following Aguilar-Savén (2004): flow chart, data flow diagrams and a workflow technique have been considered for this project.

A flowchart is a graphical representation in which symbols are used to represent operations, data, flow direction and equipment. Visualising the process with a flowchart can quickly help identify bottlenecks or inefficiencies where the process can be streamlined or improved, and the best use of a flowchart technique is when it is used to deal with processes that need a high level of detail. (Aguilar-Savén 2004). It represents a logic sequence of the process.

Data flow diagrams (DFD) are diagrams that show the flow of data or information from one place to another. DFD's describe the processes showing how these processes link together through data stores and how the processes relate the users and the outside world, and can be seen as a method of organising data from it's raw state. (Aguilar-Savén 2004).

A workflow is a flow of tasks between computer applications or people in an organization. Two or more members of a workgroup to reach a common goal can define workflow as well as any task performed in series or in parallel. Workflow is more than a technique to model a process, it is a method to analyse and improve a process, including its modelling. (Aguilar-Savén 2004 citing Hollingsworth, 1995). The workflow development process uses workflow models to capture the relevant information of the processes (Aguilar-Savén 2004).

Technique		Flow chart	DFD	Workflow
Description		Graphic representation	Descriptive diagrams for structured analysis	Computerised facilitation or automation of business process
Attributes		Flow actions	Flow of data	Flow of information, tasks and procedural rules
Characteristics		Not sub-layers Great details No overviews	Explain logical level sub-layers	Flow of tasks between computers and people
User perspective	**Strengths**	Communication ability	Easy to understand	Easy to analyse Shorter learning time
	Weakness	Can be too large	Only flow of data is shown	-
Modeller perspective	**Strengths**	Flexibility quick, simple	Easy to verify and draw	Possible build a software Data transfer Easy to make changes
	Weakness	No method available Different notations	-	Lack of a particular notation Many languages

Table 1 - Business process modelling techniques, source: Aguilar-Savén 2004

Regarding the need of high detail on the mapping process for RIAM and the high level of communication ability that the standard allows, a flow chart has been chosen as the mapping solution for this project, in a decision taken with by the board of the company.

Inside the flow chart technique, differing from other models by denoting user roles for the modelled workflow, assigning tasks to specific user groups, describing the order of the tasks, including conditions to decide which task comes next if multiple tasks are available and due to the capacity to enable the visual depiction of the activities resulting in business process models such that business processes can be defined and analysed (Jeyaraj and Sauter 2014), swim lane diagrams have been chosen as the best flowcharting technique for this project. The defining characteristic of the swim lane diagram is that each actor/department (sometimes defined at the departmental level) involved in a business process is shown in a separate swim lane and all activities belonging to the actors/departments are positioned within the respective swim lanes. The sequencing of activities is conveyed using the arrows, which typically connects the activities, in a way that the entire business process may be traced from beginning to end (Jeyaraj and Sauter 2014).

A vital factor of using swim lane as the flow charting organizational style, is that according to Jeyaraj and Sauter (2014), swim lane diagrams serve as the validations tools by which the accuracy and completeness of the business processes may be determined. Since business processes are generally cross-functional, swim lane diagrams typically contain actors from

several departments and systems analysts may need to verify the same diagrams with multiple stakeholders. And swim lane diagrams are believed to convey information effectively and efficiently to the stakeholders.

2.3 Transport Management Systems (TMS)

For freight forwarders, in common sense a TMS is the IT solution that provides support to the process of prepare a shipment. According to Gartner IT Glossary, a TMS is used to plan freight movements, do freight rating and shopping across all modes, select the appropriate route and carrier, and manage freight bills and payments. The TMS´s generically refer to the category of software that deals with the planning and execution of the physical movement of goods across the supply chain. TMS's can be used for use by shippers (such as manufacturers, retailers, distributors and wholesalers) or non-asset-based, third-party logistics (3PL's) organizations.

According to Freightquote, a TMS is a platform that's designed to streamline the shipping process. It is a subset of supply chain management concerning transportation solutions. A TMS allows shippers to automate the processes they have in place and receive valuable insights to save time and reduce costs on future shipments.

Distribution companies, e-commerce organizations and anyone else that moves freight on a regular basis realizes there are many moving parts to the shipping process, both literally and figuratively. From quoting to delivery, those shipping freights are almost always looking for ways to optimize costs and improve processes. Thanks to TMS, shippers have a solution on their side to do just that.

The main benefits of a freight forwarder are:

- Technological capabilities: A TMS provides tools to make routing decisions based on quotes, transit time and carrier mix. The centralized location for quoting will eliminate unnecessary stress and time spent during the booking process.
- Simplifying processes: A TMS can help simplify the carrier selection process, managing the entire process in one place, past shipments query capabilities and quickly match similar loads to the appropriate carriers.
- Track freights: A TMS, provides tracking capabilities of freights, receive alerts to any transit exceptions or unforeseen delays from one location and have visibility about delays and their reasons.
- Business insights: A robust TMS will offer depth insights and reporting capabilities of the shipments, according to the board's needs.

Outsourcing freight is becoming increasingly frequent and affordable to companies, and the TMS is vital for the freight forwarders, assisting in the planning and coordination of shipping, tracking, and delivering freight from one place to another. And it can also track processes and delivers customized shipping solutions that save time and money.

2.4 Leading change and organizational cultural

According to Oxford Advanced Learner's Dictionary, strategy is the art of planning and directing overall military operations and movements in a war or battle. It involves setting goals, determining actions to achieve those goals, and mobilizing resources to execute set actions and achieve goals and business strategy is a way that a firm competes in it's chosen arenas (Guedes

2017). A TMS strategy is directly related to strategic management definition that according to Guedes (2017) is a philosophy of management that links strategic planning with day-to-day decision making, seeking a fit between an organization's external and internal environments.

Strategic formulation must be done focusing on creating competitive advantage on the market, and this competitive advantage according to Guedes (2017), can be reached by creating core competences. These core competences are resources and capabilities that are valuable, rare and costly to imitate, and non-substitutable. Regarding that this is a process of change to a new reality, all the strategic formulation will face the organizational cultural.

Organizational culture is the pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration, and that have worked well enough to be considered valid and therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems (Schein 1984). Organizational culture can be related to processes and general habits (paper usage for example), and it is important to understand the strength of this culture on the strategic management to be defined and prepared on the change process. Leading change is about being with the staff guiding them to achieve the company goals (each one with is individual function working for the collective goal) and change management as guarantee of a correct change on the culture and communicating intensively with staff. On the process of leadership, it is also important to establish and communicate the vision of the company with energy and authority.

Also according to Guedes (2017) citing Larreche (2008), in terms of leadership it is important to:

- Practice "momentum" concepts continuously with contacts – take advantage of the momentum created.
- Have respect for people – Stake and shareholders treated with respect and kindness;
- Spend quality time with customers, employees and stakeholders;
- Be consistent and don't be afraid of takings risks.

In terms of change management, it is important to consider the follow tools/behaviours:

- Sense of urgency;
- Challenge organizational culture;
- Institutionalize new approaches/processes – Have a constant innovation posture;
- Communicate intensively – Make people as part of the "big picture";
- Create short-term wins – That represents parts of the long-term goals.

2.5 Business model canvas (BMC)

Business models are concerned with how the firm defines its competitive strategy through the design of the product or service it offers to its markets, how it charges for it, what it costs to produce, how it differentiates itself from other firms by the value proposition, and how the firm integrates its own value chain with those of other firm's in a value network (Bocken et al. 2014, citing Rasmussen 2007). Osterwalder and Pigneur (2005, 2010) cited by Bocken et. Al (2014), describes a business model as a series of elements: the value proposition (product/service offering, customer segments, customer relationships), activities, resources, partners,

distribution channels (i.e. value creation and delivery) and cost structure, and revenue model (i.e. value capture).

The BMC proposes 9 building blocks, according to (Brussee and Groot 2016) this are the specifications of each one:

- Customer segment - representing those who pay and those who have to decide whether or not to buy (or get) the product or service. In a B2B perspective it is important to have present that the final customers are the customer of our customers.
- Value proposition - Intent to elicit a factual description of the service or product, by listing functionality, similar products or services, looks, technical specifications, price, etc. and describes why this service or product is particularly attractive to customers, especially compared to similar products or alternatives from competitors, and why he or she could be persuaded to buy.
- Customer Relationships - divided in "Marketing and Sales" that elicits the ways is it possible to reach a prospective buyer of a service or product, (i.e. a customer) over different channels and "Customer Care" that is about the longer-term processes that needs to exist to support customers in a longer-term relationship.
- Channels - deals with the logistics of getting the product or service to end users and eliciting ways to deal with end users of the product.
- Key activities – reflect that not only that certain things have to be done to provide a new product or service, but that a process is required to keep it going. Processes are often distributed among different roles. In fact, process boundaries are often natural delineations of responsibilities, and a role responsible for different processes is often a sign of the existence of some strong coordination between processes, possibly requiring a separate process.
- Key resources - elicits the answer to what one has to be able to do, to deliver a new service or product. This is as much about the availability of technology as it is about the know-how to master it, either by having the required expertise in-house or by a suitable partnership. It is also about knowing where, when, and by what role information is required or collected, what information has to be exchanged between partners, and how it must be organized and if the resources are proper.
- Key partners – elicits naming existing people, organizations and parts of the organization. Thinking about explicit people partners ensures that the modeler is forced to think about their strength and weaknesses and the opportunities and risks they represent. It can also be seen as roles, thinking in terms of roles allows a separation of concerns and an enumeration of responsibilities that have to be distinguished.
- Cost structure – elicits listing the investments that have to be made to start a new service or product, and the cost of getting the require capital, operational costs, intangible costs such as costs resulting from damage reputation and risks (tangible or intangible).
- Revenue streams - revenue of a service or product is why it is worth doing. It is up to the prospective entrepreneur whether this is expressed in hard cash, competitive advantages, cost reduction, societal benefits, and windfall in other parts of a business or just personal satisfaction. Eliciting sources of direct and indirect cash flows or costs reductions that is realized and the ones that can also be considered despite it is not possible to express it in cash.

2.6 Performance management, dashboards and track and trace

The existence of appropriate performance management (evaluation), dashboards and track and trace are relevant to the success of this project implementation. They must collect and analyse data supported on the existence of events among the process. Events that can be used to serve internal and external needs.

For the internal needs there is the performance management and dashboards. Over the performance management, discipline that aligns performance with strategy to help organizations achieve their goals (Eckerson 2009), establish the indicators are important to guarantee the accomplishment of the strategic objectives and the establishment of few (less than 10) indicators in a business, that seem to be crucial. According to Parmenter (2014) indicators must be divided into Result Indicators sand Performance Indicators.

RI's (Result indicators) shows an overall performance and help the board focus on strategic rather that management issues and PI's (Performance indicators) help management and staff in what they must do to achieve desired outcomes. Inside these indicators (result and performance), it is possible to find key indicators, the ones that point where to change to dramatically increase results and performance.

Performance management is popular today because it helps organizations become both efficient and effective. Other management disciplines — such as activity-based costing, reengineering, and total quality management — have focus on making organizations more efficient by reducing costs and streamlining processes. In contrast, performance management focuses on strategy and direction so that processes, expenditures, and resources move the organization in the right direction. It uses technology to ensure the efforts made by all individuals and groups are aligned with strategic objectives (Eckerson 2009).

Over the dashboards, Alexander Chiang affirms: "Creating an effective dashboard application is always a collaborative effort. When you first look at the data, you risk choosing an incorrect delivery platform for your organization, one that may not address the needs of the end users." So, trying to reach a successful approach, according to Chiang (2009), the process of creating dashboards must be done with the collaboration of stakeholders, starting with end users and considering also: business analysts, data base team, IT team and the project manager. So, end users are considered first, then the data is examined and finally a dashboard solution is selected. With this approach the perspective is to ensure that the end users expectations are met and that the company's helping them making effective businesses decisions.

For the external needs, track and trace have been considered. Tracking is a method of determining the ongoing location and state of items during their way throughout the supply chain. In this context, we will use 'tracking' to refer to monitoring the location and other information regarding an item's state at any time. Tracing information enables forward traceability which refers to the exploration of where-used relations between objects and operations. Similarly, tracing information also enables backward traceability which refers to the exploration of where-from relations between objects and operations. (Kelepouris, Silva, and McFarlane 2006)

3 Project contextualization

According to Mário Silva, RIAM's country manager, the main purpose of a freight forwarder is to offer solutions to supply chain requirements and the main activity is to manage information. The project has a focus on the sea freight and air freight processes mapping, and a TMS strategy review, always having present the information managing.

3.1 Sea Freight

Sea freight has a transportation process with long lead times (tasks and lead times vary according to import or export processes). Export processes have a complete sequence on what is done without breaks, but import processes have tasks on the beginning and then a break until the arrival of the goods to perform the final tasks. Despite the long lead times, having present the good price/space relation, sea freight is the transport methods with most processes in RIAM.

Regarding the sea freight, one of the most important issues is the integration with INTTRA. According to the INTTRA website, INTTRA allows a complete integration of services to help their network members connecting directly to their logistics system of choice. With the headquarters in the New Jersey (USA), INTTRA is a joint venture between CMA-CGM, Hamburg Sud, Hapag-Lloyd, Maersk Line, MSC (Mediterranean Shipping Company), and UASC to create a standard electronic booking system for the sea freight industry. With accountability, transparency, innovation and inclusiveness as main values, INTTRA's innovative transaction and information products, combined with the scale of their network, empower customers to trade multiple parties and leverage sea industry information to improve their business.

3.2 Air Freight

Air freight comparing to sea freight or even road freight, is a transportation process with short lead times, which leads the company to a scenario where everything is done almost at the same time. Also, considering it's increased price compared to the sea freight's rate, it's a transportation method that applies to objects with high value and a specific transportation needs.

One of the most important issues is the CHAMP integration capacity and the e-AWB (electronic Air Way Bill) that will progressively start to be mandatory for the air companies. According to CHAMP website, headquartered in Luxembourg with offices in London, Zurich, Manila and Frankfurt/Main, the joint venture between SITA and Cargolux Airlines (Cargolux), CHAMP Cargo systems is jointly owned by SITA and Cargolux. Having the mission of help air cargo organizations achieving their business objectives by providing integrated solutions designed to support and transform their business processes.

The Air Waybill (AWB) is a critical air cargo document that constitutes the contract of carriage between the "shipper" and the "carrier" (airline). The e-AWB is key digital improvement on the air freight transportation.

According to the IATA website, the e-Air Waybill solution allows the electronic filing of transportation document of an air cargo shipment to a Carrier or an Authorised Agent. e-AWB is an industry-wide initiative by International Air Transport Association (IATA) to replace paper AWB. The digital advancement has enabled more Exporters to process documents much quicker. The replacement of AWB with e-AWB allows quicker turnover of electronic contract of carriage between the freight forwarder and the airline to make cargo transportation by air

faster, more reliable and cost effective. e-AWB provides data accuracy, confidentiality and efficiency to address the ever-changing challenges in the air freight and logistics industry.

For example, companies as Lufthansa, started to apply fines to the freight forwarders that do not use the e-AWB.

3.3 INFORTRANS: TMS strategy review

The current information technology system of RIAM's is INFORTRANS, and it is used on all the locations where RIAM is present. INFORTRANS is a system that works on the UNIX environment and was created in 1990 with the foundation of RIAM as a joined company of the road freight. In 1999, with the separation of RIAM and the road freight both companies continue to use INFORTRANS. This system has been developed essential for road freight but have been adapted for the air and sea reality, and this adaptation sometimes represents a problem on the shipment preparation activities in air or sea freight. Figure 3 below with the INFORTRANS interface.

INFORTRANS, is integrated with: Freight offer (quotations system), RIWARE (warehouse management system), open credit, credit disinhibition, invoices portal (where the invoices are introduced into the system), file control (to create provisions), bill flow (invoices acceptation

Figure 3 - INFORTRANS interface

to payment), Qlikview, and open reports (to export data and data analysis), to ensure the informatic support to all the tasks to perform a shipment process.

According to João Granado, responsible for the IT department for freight forwarders in RANGEL, internal or external development of solutions regarding TMS is always a dilemma for companies. But internal development has the advantage of having the possibility of adapting the system according to people's needs, but this must be kept if companies have the capability to innovate with the support of the operatives in terms of being one step ahead on the needs of a TMS and on the optimizations that can simplify or diminish their tasks.

Regarding external developments, even though some organizations (mostly in countries under development) do not have digital procedures, the possibility of integrations with an external software became vital for the freight forwarders. Another important issue for RIAM is the

capability of the TMS to determinate the process (transforming the company in a processes-based company) and not people determining how the TMS must proceed. These integrations allied with the digitization features of a modern TMS, can transform a company and begins a takeover process.

3.4 Business model canvas

The actual RIAM value proposition is to offer transportation as freight forward (sea or air) services provider (managing information). And the main customer segment of RIAM are the companies that need international transportation but also people with international transportation needs.

The customer relationships are guaranteed by email, phone calls and door-to-door visits. All this is managed by SAP CRM (Custom Relationship Manager).

The channels of RIAM are e-mail and the transport units.

The key resources of RIAM are the operatives (commercial and operational departments) and the IT system (INFORTRANS) that supports their activity.

The key activity of RIAM is to prepare shipments.

The key partners of RIAM are RT (Rangel Transitários) on the road freight, ERDO (Eduardo Rangel Despachante Oficial), the insurances broker and the agents that maybe needed when exporting/importing to/from a country where Rangel do not have an office.

The main revenue stream source are the clients and the main source of costs are the staff and the variable costs with suppliers according to the number of shipments done.

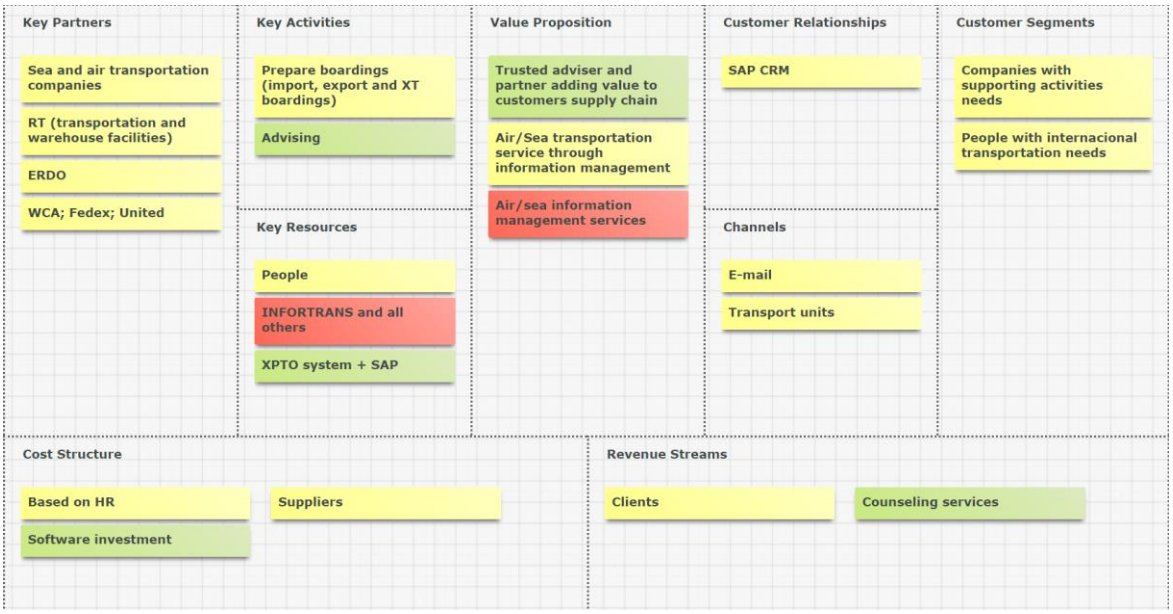


Figure 4 - BMC before and after (in yellow what continues, in red what disappeared and in green the new items)

The new BMC aims with the TMS are (figure 4):

The value proposition to the companies will be to become trusted advisors and partners adding value to their supply chain.

The key activity of RIAM will be to prepare shipments and have advisory services.

The cost structure will have the current costs and information solutions cost.

The revenue stream will have the actual revenues and the revenues from the advising services.

3.5 Problem definition

Managing information is not an easy task and can generate different expectations according to the different markets, some markets are more demanding than others. Every freight forwarder or company can do it and RIAM does this and sales have been increasing every year despite the economic crises periods in Portugal or in the main markets (Angola and Mozambique).

Strategy issues, regarding the capability to enter in new markets (more stable markets), suitability issues and productivity reasons have led to the need of this TMS strategy review. On a context of operatives preparing the board everyone in each way, it is important to have a solid TMS supporting the strategy and people, with people in some cases adapting themselves to the system defined process and not the other way around. This reality of operatives realizing the process on their own way and the need of having the processes documented to define the TMS, lead RIAM to the need of mapping the processes in an "AS IS – TO BE" model. AS IS to understand in general the way it is done and TO BE to design through an optimization process, a unique process for the company (guide by milestones that must be respected).

The first question that has been the trigger event for this project was: "What is our current process?" The answer is reached with the mapping of the AS IS processes, mapping the main processes of RIAM. With special attention to the operational department tasks.

After reaching the AS IS processes, it is important to ask: "How can we improve this?" And that will be the trigger event to the optimization process and the TO BE mapping.

In the process of the TO BE definition, the large portfolio of features of a possible external TMS solution, it is important to take in consideration the third and last question: "How we ensure that the TMS will support our goals?" Deciding the features to be considered on the TO BE process, determining the improvements that will introduce on RIAM's operation with TMS and producing recommendations to the planning and implementation activity of the TMS.

During all this process, involving all the layers of RIAM it was vital to ensure the right planning and implementation of this review. On Chapter 6.7, the processes of leading this change inside the company are approached, in order to understand the importance of leading people on a process of change to a new organizational culture, with new values.

All this strategy review, on a high-level dimension (strategic goals) can create the necessary foundation to diminish the dependence of RANGEL in Portuguese Markets (Angola and Mozambique), that represents unstable markets for economic and political reasons, expanding to new markets and increasing productivity. On a medium-level dimension (tactical goals), it will transform the company into a processes-based company, avoiding the current reality of people doing the process on their own way. On a low-level dimension (operational goals), it will launch the foundations to a simple and digitized process, a paperless company, performance evaluation definition and increased number of closed processes.

3.6 Assumptions

All the dissertation has been done with the following assumptions:

- The TMS chosen will have all the necessary modules to perform the shipments, excluding the financial module since RANGEL will continue to use SAP.
- There isn't a decision about the TMS to be chosen (from the 3 possible solutions).
- It is an optimization process with the operatives as the centre of the mapping process.
- On the forecasts, percentages according to RIAM's board expectations.
- The operatives perform all the process from the quotation to the last invoice verified, and not operatives performing specific activities of all the processes.

4 Methodology

4.1 Research design

Research is about acquiring knowledge and developing understanding, collecting facts and interpreting them to build up a picture of the world around us, and even within us. The different types of research design may involve the use of their own specific types of research methods, developed specifically to solve the problems inherent in that design. However, some methods are widely used across many research types. (Walliman 2011).

According to Teixeira (2017), there are four main types of research designs:

- Descriptive – That help provides answers to the questions of who, what, when, where, and how associated with a particular research problem. Descriptive study is used to obtain information concerning the current status of the phenomena and to describe 'what exists' with respect to variables or conditions in a situation. They can yield rich data that lead to important recommendations, colleting a large amount of data for detailed analysis. It cannot be used to discover a definitive answer or to disprove a hypothesis, because often utilize observational methods and the results cannot be replicated.
- Exploratory – Conducted about a research problem when there are a few or no earlier studies refer to. The focus is to gaining insights and familiarity for later investigation or undertaken when problems are in preliminary stage of investigation. It provides an opportunity to define new terms and clarify existing concepts. Help establishing research priorities. It cannot generalize findings to the population at large, because generally utilizes small sample sizes. And limit the value in decision-making, thus to the unstructured characteristic of this type of studies.
- Correlational – Determinates whether or not two variables are correlated. This means to study whether an increase or decrease in one variable corresponds to an increase or decrease in the other variable. Predictions may be established based on correlational studies. It can identify: Positive correlational (same behaviour for both), negative correlation (inversus behaviour on the variables) and no correlation (one does not affect the other). It cannot prove that one variable causes a change in another variable, this is, correlation does not equal causation.
- Explanatory – Causality studies may be thought of as understanding a phenomenon in terms of conditional statements in the form, 'If X, then Y.'. This type of research is used to measure what impact a specific change will have on existing norms and assumptions. Variation in independent value, leading to results or changes on a dependent variable. Conditions necessary for determining causality: Empirical association; Appropriate time order; Nonporousness. It cannot prove that there wasn't the possibility of by coincidence, two unrelated events appear to be related. Causality can only be inferred, never proven.

It is the researcher interest that decides the nature of the research problem, and this will indicate the appropriate type of research to follow. Once the objectives of a research project have been established, the issue of how these objectives can be met, leads to a consideration of which research design should be chosen. The research design provides a framework for the collection and analysis of data and subsequently indicates which research methods are appropriate. The researcher can combine two or more types of research design, particularly when the subject

combines the study of human behaviour with that of, for example, economics, technology, legislation or organizations. The different types of research design may involve the use of their own specific types of research methods, developed specifically to solve the problems inherent in that design. However, some methods are widely used across many research types. (Walliman 2011)

4.2 Research method

Research methods are the techniques used to do research. They represent the tools of the trade, and provide ways to collect, sort and analyse information to conduct the research to conclusions. Using the right sort of methods for a particular type of research, it is important to be able to convince other people that the conclusions have some validity, and that the new knowledge created is soundly based. (Walliman 2011)

The methods are about data, according to Walliman (2011), we can dive data that into two types: data source and data characteristics.

Regarding data source, data come in two main forms, depending on its closeness to the event recorded. Data that has been observed, experienced or recorded close to the event are the nearest one can get to the truth, and are called primary data. Written sources that interpret or record primary data are called secondary sources, which tend to be less reliable.
On primary data, there are four basic types of primary data, distinguished by the way they are collected:

1. Measurement – collections of numbers indicating amounts, e.g. voting polls, exam results, car mileages, oven temperatures etc.
2. Observation – records of events, situations or things experienced with the researcher own senses and perhaps with the help of an instrument, e.g. camera, tape recorder, microscope, etc.
3. Interrogation – data gained by asking and probing, e.g. information about people's convictions, likes and dislikes etc.
4. Participation – data gained by experiences of doing things e.g. the experience of learning to ride a bike tells the different things about balance, dealing with traffic etc., rather than just observing.

On secondary data, just as the researcher have been bombarded with primary data, the researcher is cascaded with secondary data in the form of news bulletins, magazines, newspapers, documentaries, advertising, the Internet etc. All research studies require secondary data for the background to the study. The advantage of using sets of secondary data is that it has been produced by teams of expert researchers, often with large budgets and extensive resources way beyond the means of a single student, so it cuts out the need for time consuming fieldwork. The disadvantage is that the researcher misses out on the experiences and skills gained by having to generate is own primary data from real-life situations. The data will also have been collected with a purpose that might not match easily with what is need for the research focus.

Regarding data characteristics, it can be divided into qualitative and quantitative data.

Quantitative data can be measured, 'more or less' accurately because it contains some form of magnitude, usually expressed in numbers. Mathematical procedures can be used to analyse the numerical data. These can be extremely simple, such as counts or percentages, or more sophisticated, such as statistical tests or mathematical models.

Qualitative data cannot be accurately measured and counted and are generally expressed in words rather than numbers. Essentially human activities and attributes such as ideas, customs, mores, beliefs, that are investigated in the study of human beings and their societies and cultures cannot be pinned down and measured in any exact way. These kinds of data are therefore descriptive in character. This does not mean that they are any less valuable than quantitative data; in fact, their richness and subtlety lead to great insights into human society.

Attention that Qualitative data rely on human interpretation and evaluation and cannot be dispassionately measured in a standard way. Checks on the reliability and completeness of qualitative data can be made by consulting a variety of sources of data relating to the same event – this is called triangulation.

Types of data and methods	Primary	Secondary	Qualitative	Quantitative
	• Observation; • Surveys (open and closed questions); • Interviews (Structured, unstructured and semi-structured); • Experience;	• Written materials (documented) • Nonwritten materials (audio and interviews) • Survey data (statistical data)	• Observation notes; • Interviews transcriptions; • Literature; • Documentary films; • Human interpretation;	• Census; • Economic data; • Performance data; • Measurements in scientific end;

Table 2 - Types of data and methods, source: Walliman (2011)

All the methods are valid and must be applied according to the perception of the researcher to be the most suitable as possible to the research problem.

4.3 Design and method applied

Regarding the research design, with an optimization perspective, the method applied is the descriptive design mainly for the AS IS and then a projection of the process, with an exploratory approach to design the future mapped solution, having present that there are not many studies about the theme, and trying to gain insights in how is possible to reach the goals of the project improving the process and gaining familiarity with the current process.

The project has been divided into tree (3) phases: AS IS, TO BE/Optimization and TMS analysis. The methods have varied according to each phase, having attention to the suitability of the methods to each phase.

The methods for each phase are:

- AS IS – Semi-structured interviews (Appendix A) and mapping the processes, without any knowledge about the process semi-structured interviews has been chosen due to the need of obtaining specific information of the operatives to map the processes in a current situation.
- TO BE/Optimization – Open interviews, observation, mapping and describing the processes – with some knowledge of the process and an "out of the box" view, open interviews have been important to obtain some possible improvements on the operative's speech's, avoiding vitiating the thinking of them with the researcher opinion and/or specific questions. Observation has been important to find some improvements points or inefficiencies that the operatives can be blinded seeing that they are already addicted to the reality.
- TMS – Brainstorming, open interviews and semi structured interviews - On this phase, interactions with operatives was also crucial, to understand that despite the process improvements, what they expect from a new information technology solution (the TMS) and taking advantage of the existence of a planning team for the TMS, brainstorming for solutions with this team and one general brainstorming session with all the operatives in Porto and Lisbon. On these processes, semi-structed interviews to define the dashboards and performance evaluation (Appendix B) have been made, to understand directly what the different groups directly connected to the process expect from them.

In general, all the processes have been accompanied by the business model canvas development and evolution, to guide the project on the boundaries of the strategic orientation of RIAM's board.

5 Processes mapping and optimization

The first step of the processes mapping has been the identification of the process map in RIAM's (Appendix C and Appendix D), two levels of the processes have been identified. This step conducts to the creation of the responsibilities matrix (Appendix E and Appendix F). Dividing the processes in levels, is important not only for the responsibilities matrix but to support the optimization processes, improving the analysis and providing milestones between the different phases of processes, to the TO BE mapped process.

The second step was to detail the processes of the maps in the different tasks performed by the operatives.

The third step has been the AS IS mapping, optimization of the processes and TO BE mapping of these different processes of the responsibilities matrix.

The fourth and last step was to write the work instructions of the TO BE processes.

Regarding the importance of the transactions with countries where RANGEL is geographically represented (more than 60% of the transactions) the only processes represented on this dissertation as a use case (with AS IS, TO BE and work instructions/description of the process), have been the process of export in Full Container Loading (FCL) to the other RANGEL offices worldwide, with the container loading on the client or in RANGEL (FCL/FCL-r).

All the other processes mapped are listed in the Appendix G.

5.1 AS IS

Semi-structured interviews have been the method applied to obtain AS IS information about how the process is done and flowchart (swim lane in specific) has been the technique chosen to organize the information as a process.

During this activity of mapping the fact that each operational does the process on its own method, transformed the AS IS mapping process in a challenge because just one approach must be considered as the better one. And this diversity of methods results in the fact that the operatives almost don't use the main IT system (INFORTRANS) and the system doesn't provide a conductive line/workflow to the processes.

The existence of many IT systems is one of the characteristics and problems identified on the AS IS process. The current IT systems used are:

- Filecontrol, to provide costs;
- Bill flow, to verify invoices;
- Qlikview, to extract information and analysis of the system;
- Open and extract reports;
- RIWARE, to connect with the warehouse;
- Invoicing Portal, to consult invoices;
- Create and open clients in the system;
- Clients unlocker, to reactivate a client after a block for credit reasons;

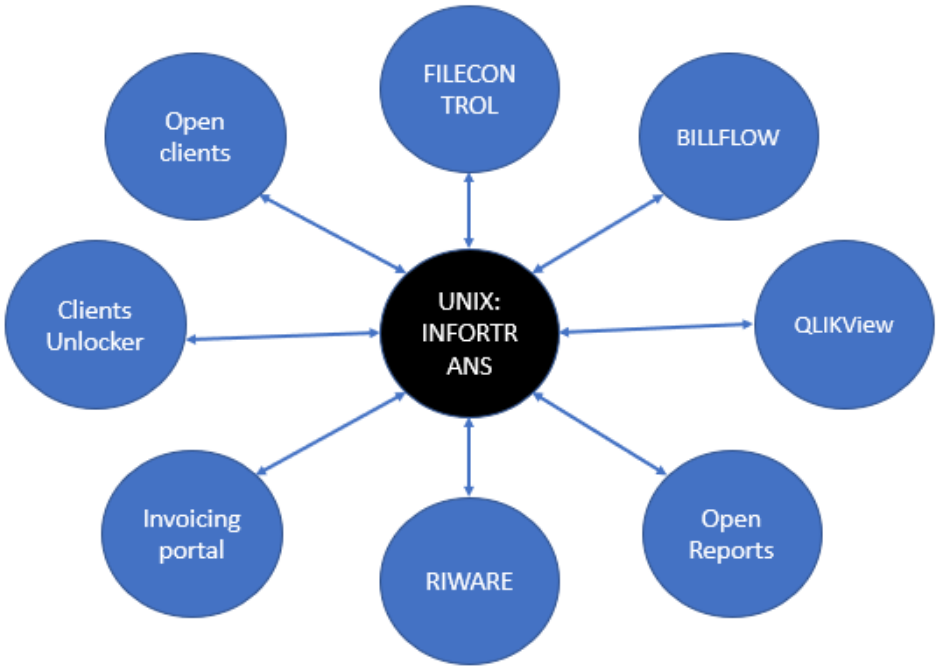


Figure 5 - RIAM software's to perform a shipping

In total, 18 AS IS processes have been mapped, dividing into air (5.1.1) and sea processes (5.1.2) – appendix G.

5.1.1 Air Processes

Export and import process have been mapped, dividing the processes in phases. In total, 8 air processes have been identified and 7 mapped.

Export: Booking (mapped), consolidation (mapped), AWB Direct (mapped) and invoice and feedback (mapped).

Import: Booking (already mapped on export), import CIF (mapped), import FOB (mapped) and reception and delivery (mapped).

5.1.2 Sea Processes

Export and import process have been mapped, dividing the processes in phases. In total, 12 sea processes have been identified and 11 mapped.

Export: Booking (mapped), booking to the company (mapped), FCL (mapped), FCL-Rangel (mapped), LCL (mapped), LCL-Co-loader (mapped) and invoicing and tracking (mapped).

Import: Booking (already mapped on export), tracking (mapped), import transit (mapped), import PT (mapped) and reception and delivery (mapped).

5.2 Optimization

Open interviews and observation have been the method applied to obtain feedback for the operatives about possible improvements or points to be optimized on the existent process.

During this activity the "INFORTRANS addiction" has been a difficult issue to deal with because it conditioned the thinking of the operatives to a new reality, on this context constant interaction and a presentation/brainstorming session with all the operatives about the importance of the project to RIAM and to emphasize that the solution would be an external and modern solution (allowing integrations and automatisms among the process), has been crucial to develop a new state of mind about a process in a new TMS reality and to receive opinions and contributions about the needs of the operatives in the process.

The existence of many IT systems to do all the activities of one shipment process, has been also one important issue when developing the optimization process.

5.3 TO BE

Open interviews and observation at the same time with optimization, has been also the method applied to obtain the TO BE information's and needs, and flowchart (swim lane in specific) has been the technique chosen to organize the information and improvements proposed in a process.

The TO BE process have been mapped having in mind the basis for a new TMS. And one of the premises of this is that all the system will bundle the activities and needs to prepare a shipment making unnecessary the need of using other systems, despite SAP to check the invoices.

In total, 17 TO BE processes have been identified and 15 TO BE processes have been mapped, dividing in air and sea processes – appendix H.

5.3.1 Air Processes

Export and import process have been mapped, dividing the processes in phases. In total, 7 air processes have been identified and 6 mapped.

Export: Pre-boarding (mapped), booking company and documents preparation (mapped), consolidation or direct (mapped) and invoice and feedback (mapped).

Import: Pre-boarding (already mapped on export), import CIF/FOB (mapped) and reception and delivery (mapped).

5.3.2 Sea Processes

Export and import process have been mapped, dividing the processes in phases. In total, 10 sea processes have been identified and 9 mapped.

Export: Booking (mapped), booking to the company (mapped), FCL/FCL-Rangel (mapped), LCL/LCL-Co-loader (mapped) and invoicing and tracking (mapped).

Import: Booking (already mapped on export), tracking (mapped), import transit (mapped), import PT (mapped) and reception and delivery (mapped).

5.4 Operational changes summary

From the AS IS to the TO BE it is important to emphasize the existence of an input-output logic (guaranteeing the chaining of the different phases of the process) and the existence of a procedure to a direct booking with the operational when having a valid quotation. Communication with companies and tracking vessels will be done by the system automatically.

Documents are separated in internal and external, allowing the issuing of many documents by the system and documents management database. House B/Ls (Bill of Landing) will be issued and edit on the system. Provisions will be done automatically by the existence of price lists and service requests, this will ensure the existence of provisions. On export processes, pre-alerts will be sent automatically after the vessel departure, facilitating the process and particularly the import process on the destiny if it is a RANGEL office. The invoices of suppliers will pass through a screening through a business rule for each type of invoice, diminishing the number of invoices on SAP system to be checked. Operatives will need to use SAP to check the invoices that constitute exceptions.

On a process with exportation and importation in a RANGEL office or processes to the islands, the system will allow the possibility of send processes to the other office and being open there (intercompany capabilities), and this automatism will allow time saving on the activities.

Chapter 6.3 details the improvements expected to be obtained on the TO Be process due to the existence of the new TMS.

5.5 Use case

Regarding the need of having an intercompany process (exportation and importation between RANGEL offices), the predominance of sea freight and the fact that there are many mapped processes, the process presented on this project representing a sum up of the work done is the Export-Import process inside RANGEL, composed by two (2) parts: Export FCL (Appendix H, AS IS and Appendix I, TO BE, in green activities for FCL with container loaded on RANGEL and in white activities that sometimes are not needed) and Import FCL (Appendix J, AS IS and Appendix K, TO BE, in green activities for FCL with container loaded on RANGEL and in white activities that sometimes are not needed).

The TO BE export process have the following work instructions:

- Booking: The request starts on the customer/agent (it can start directly in the open booking, if there is a valid quotation) and it is received by the commercial department, where they attribute a number and forward to the pricing. Pricing is done by this department sometimes with the help of operations and with results in the values that will be included in the quotation to the client (prepared by the commercial department). After the acceptation of the quotation, commercials must fulfil the quotation attach with other data or indications by the customer (insurance, house B/Ls, etc), making the quotation valid to the operatives. If the quotation is refused, the process ends.
- Booking to the company: With the quotation, the operatives must open booking on the system (transforming the quotation), and then fulfil the reservation request, receive the confirmation from the company and with that confirmation they must issue the cooking confirmation to the client.
- FCL/FCL Rangel: Operatives start requesting documents from the customer (goods invoice, packing list and in some cases power of attorney), the client send the information and the operative must confirm if everything is correct and if not, request other/correct documents. Then the operative must perform the following tasks: schedule the pick up by fulfilling the pickup request, request the export customs (export declaration and other specific declarations if needed), pickup goods (loading declaration), in case of being a FCL on RANGEL loading container (cargo manifest), and send the container to terminal. After sending the container to terminal (VGM -

Verified gross weight document), issue the insurance sending the insurance request (if the quotation indicates the need of insurance), issue house B/L, request the draft of the B/L sending data for the B/L, and confirm with the client and confirm with the company the B/L.

- Invoice and tracking: With the draft of the B/L and all the documents treated, operative must verify if the process has all the service requests (if not prepare it on the TMS, to send the data to SAP and issue the PO's), and then after the vessel departure original B/L can be issued, customer invoiced, and the system will remember the operative to send the pre-alert to the RANGEL office of importation. After that if needed (depends on the destiny) ARC /WAVERs (boarding certificates) must be requested, received and send to the importation office and operative must verify if there is any invoice to check (and check that invoices that constitute exceptions to the automatic checking of DAF – Financial and Administrative department of RANGEL).

The TO BE import process have the following work instructions:

- Request receive: The pre-alert of exportation must be accepted and data of it must be confirmed. If needed, insurance must be requested by an insurance request and then it is a moment of tracking until the arrival date.
- Documents preparation: During the tracking, operatives must request additional documents, receive them and prepare the documents for the arrival of goods and for the clearance request. After the arrival of the goods (arrival document), freight must be invoiced to the customer and clearance must be requested by a customs clearance request, to finalize this phase, operative must verify if everything is with PO's (Purchase orders) and receive the clearance (import customs), finalizing invoicing the clearance to the customer.
- Reception and delivery: Goods must be picked up (by the deliver of the B/L or release order) and in case of DAP (Delivered at Place) or DDP's (Delivered Duty Paid), goods must be delivered (receiving the POD – Proof of delivery). Finally, operative must verify if there is any invoice to check (and check that invoices that constitute exceptions to the automatic checking of DAF).

All the service requests, the system will automatically communicate to the supplier, provision the cost through a price lists working behind (if there is not price list, the system will request the operative to fulfil the price) and send data to issue a PO's to SAP. With exception to the insurance request (PO's will accumulate to be sent twice a month) and other governmental requests in specific cases (e.g. Angola license), that cannot use PO's.

6 Transport Management System

The decision between an external solution for TMS inside RIAM's (allowing integration gains) or to continue the process of improving the internal solution, was a crucial step of the strategy review. And the final decision was for the external solution. But even with an external solution, according to Aguilar-Savén (2004) citing Aguilar-Savén and Olhager (2002), both experts in the field of information technology and business engineering have concluded that successful systems start with an understanding of the business processes of an organization. Based on this, the mapping and analyses of the business processes of the freight forwarder activity have been treated as a vital step on the TMS strategy review and implementation.

Brainstorming, open interviews and semi structured interviews have been the method applied to obtain feedback of the operatives about important features on an IT solution. The basis for this analysis was the TO BE process, the TMS must be able to support the TO BE process of the company having a special concern on digitization and automatisms. This part of the project results on the need of mapping the workflows to implement the TMS, to have a closed process, in which the operative must work according to how the TMS is defined (workflow driven process).

The increase on the productivity with the TMS implementation can take RIAM to two possible options to the future: reduce costs suiting the capacity to the business volume or maintain capacity and continue trying to increase the business volume that will be analysed on the chapter 6.6, potential benefits.

6.1 Key features

The TMS key features and capabilities have been defined by RIAM and DSI and sent to the main TMS suppliers competing to implement the new TMS on RIAM, according to the needs and the processes.

Constitute mandatory TMS features for RIAM:

- Integration with CHAMP and INTTRA
- Airlines e-AWB and editable B/Ls
- Processes clone capabilities (Intercompany to other countries and islands)
- Event code and workflow driven
- Visibility tools and measurement of the workflow
- Electronic-documents (e-docs) management capabilities
- Automatic cost provisioning (integration with SAP)
- Reporting capabilities
- Compliance (GDPR - General Data Protection Regulation, and customs)

These features are mandatory to guarantee that all RIAM needs and goals can be achieved, and the processes may occur according to predicted.

6.2 Main goals

Having present the actual situation in RIAM, the main goals are divided in two:

1. Increase productivity – this will be achieved with the process optimization through the new TMS implementation and will allow the increase on the capacity of the company, allowing RIAM to be able to follow with a pro-active posture to the market grow;
2. Processes based company – It is possible to have an uniformization of the processes and to introduce important improvements on the digitization field, decreasing the ecological footprint.

These main goals will be achieved with the implementation of the improvements described on 6.3 and by the implementation of the recommendations described on 6.8.

6.3 Improvements

All the improvements must be based on tree main pillars: Tasks, information and collaboration. Tasks based on the responsibilities of each department, information based on the information flows and documents that each task generate/receive (with documents database management) and collaboration as to how people interact to achieve results.

Regarding tasks and information, there are 7 clear improvements:

1. Responsibilities definition: With the process mapping activity and new TMS, it is possible to redefine the responsibilities between the commercial department and the operational department in RIAM. The process starts on the commercial side, and they will be obliged to send certain information (output) to the operational so the latter can start the process with that information (as an input). This is about an input-output logic that must work to all the phases of the process.
2. Service requests: Forms that RIAM operatives must fill to request a service during a shipment process (in average each shipment has 4 service requests). These service requests must be mandatory allowing the system to send directly to the supplier the service request, provide costs and send information to SAP on issues on PO's for the suppliers. These service requests will increase the automatism and the formalization of the tasks on the process. The PO's will facilitate the relation of RIAM with the Financial department of RANGEL, to diminish the number of invoices available to check.
3. Price lists: Lists with the process of the services with the suppliers working on the system, providing better negotiation timing with the suppliers and automatisms on the pricing and on the service requests. This price lists will need one responsible to update the tables on the system.
4. Valid quotations: Valid quotations with frequent clients on the system, allowing the clients to contact direct the operatives to start a process, without the intervention of the commercial department. Guaranteeing that a quotation is used to perform a shipping. Operatives must always start a process with a quotation.
5. Digital documents management system: A database that allows the operational to store the processes on the system with the documents generated by the system and the documents uploaded during the process. This database will allow the diminish of paper on the process (consequently the environment footprint) and simplify organization and location of processes. It is important to ensure the correct physical storage of the original documents.

6. Digital documentation (e-AWB, editable B/Ls and automatic pre-alerts): e-AWB are a demand from air companies, editable B/Ls will allow the procedures with letters of credit and house B/L and the automatic pre-alerts (on the COB) allowing to select the documents to send to the client with increase the automatisms on the process and diminish the errors.
7. Integrations: Champ and INTTRA integrations will allow to create important automatisms to the process in terms of receiving information from the vessels on INTTRA and send e-AWB through CHAMP, companies have started to turn the e-AWB as mandatory (e.g. Lufthansa).
8. Event code during the process: Introducing events during the process allows the establishment of performance indicators with measurement comparing to the homologues periods and between events, and this information will be used as a source of information for the dashboards. There will be there types of events: Operational, Financials and for track and trace.
9. Track and trace: In the TO BE process and with the TMS, it will be possible to have track and trace of the cargo (for air and sea freight). This will allow the clients to follow their cargos moves and their main events of the process through the MyRangel Portal.

6.4 SAP integration

Having present the current existence of SAP as a CRM of RIAM and in usage by the financial department of RANGEL, this project considered only the existence of SAP as a financial tool for the process in RIAM (process done by the financial center of RANGEL).

In this case, it is considered important to grant integration to:

- Customers and suppliers master data
- Accounts receivables data
- Accounts payable data

These integrations will be vital to guarantee the correct functioning of the TMS providing complete information about the processes and guaranteeing a better information to the decision-making process by the RIAM board (guaranteeing data timeliness).

All the integrations will be guaranteed by the Information Systems department of RANGEL (with external support of the manufacturer).

6.5 Potential benefits

Potential benefits have been an analysis made to add value to this project. According to a set of assumptions and expectation of the RIAM board, this chapter analyses the potential benefits of the TMS implementation and an analysis of how this TMS can promote savings and/or avoid costs.

These potential benefits have been based on assumptions and expectations of the RIAM board. Considering the increase of business in new markets (Asia and EUA) and the probability of increasing the current markets (Angola with the increase on the Brent value and Mozambique with the beginning of the exploration of oil and gas)

In terms of productivity, RIAM board expects an increase of 60% of the actual capacity for the estimated period (2018-2022) and in terms of revenues and annual billing, they expect an increase of about 50% for the estimated period (2018-2022).

For the analysis, it has been considered an increase of 46% of the actual capacity for the estimated period (2018-2022) and in terms of revenues and annual billing, the increase considered is of 32% to the estimated period (a moderate perspective).

6.5.1 Productivity

Considering the number of processes from 2017, installed capacity has been calculated for each area of RIAM: Air, Sea, Sea-Islands (from Portugal) and Healthcare, separating import and export, and considering the average of the first 2 employees with more processes times the number of FTEs (full time - equivalents) or the best employee times the number of FTEs (when there are 3 or less than 3 employees on a department). For all the others that have been aggregated to avoid distortion of results, all the processes have been considered that 75% of capacity is being utilized, so the capacity is 25% above the current number of processes done (utilization).

Considering an increase on the number of processes done per year (forecasted based on the total amount of processes in 2017) with 2019 as the first year with the TMS working and a total increase of 46% in the productivity (splitted in five years: 2018-2022) with the TMS. The 46% of increase has been considered, with 7% on the first year, a peak of growth on the second year (18%) and an average of 7% of growth per year until 2022. This forecast has been made, believing that on the first-year employees will face some adaptation problems and that the TMS will be implemented on all the other countries geographically represented by RANGEL only on the second year (maximizing the gains) – figure 6.

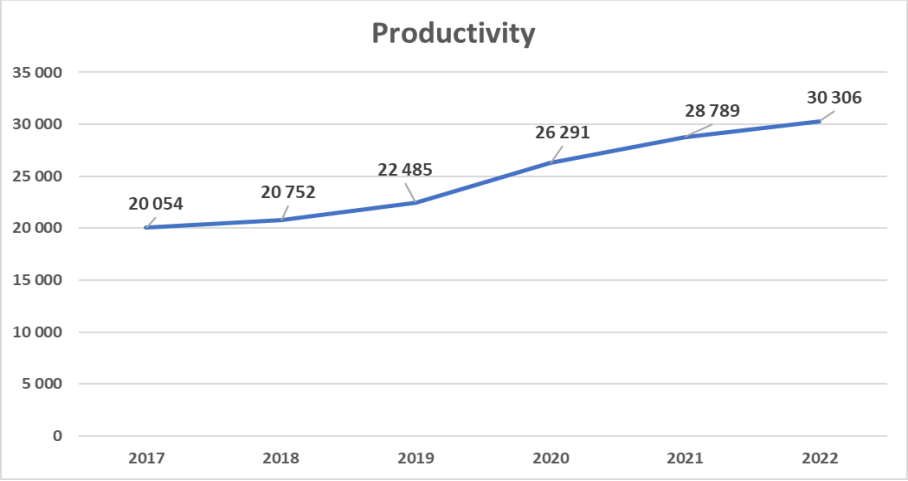


Figure 6 - RIAM productivity forecast with the TMS

The productivity per FTE will increase due to the existence of a simple and timesaving process to perform the shipment.

6.5.2 Reducing costs

The productivity per FTE will increase and consequently the cost of the FTE per processes will decrease in 25%.

Deciding for a strategy of costs reduction, adjusting the capacity to the businesses volume. Keeping only 90% of the capacity in utilization, the solution is to adjust the number of employees that according to the average salary per FTE in RIAM (30 955€) would generate a saving of 1 021 531,03 € accumulated for 5 years (2018-2022), maintaining the revenues on a total amount of 27M€.

Below, figure 7 sustains the employees decrease due to the increase in the productivity and the decision of reducing costs and maintaining the businesses volume.

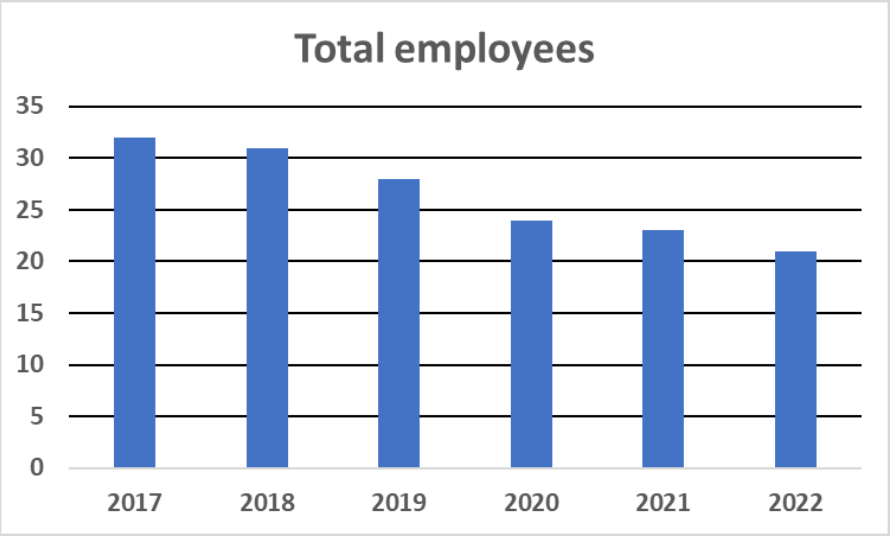


Figure 7 - Staff need with the TMS and maintaining business volume

6.5.3 Increasing business volume stragey

Deciding for a strategy of increasing the business volume, has been considered an accumulated increase on the revenues or annual billing of 32% (figure 8).

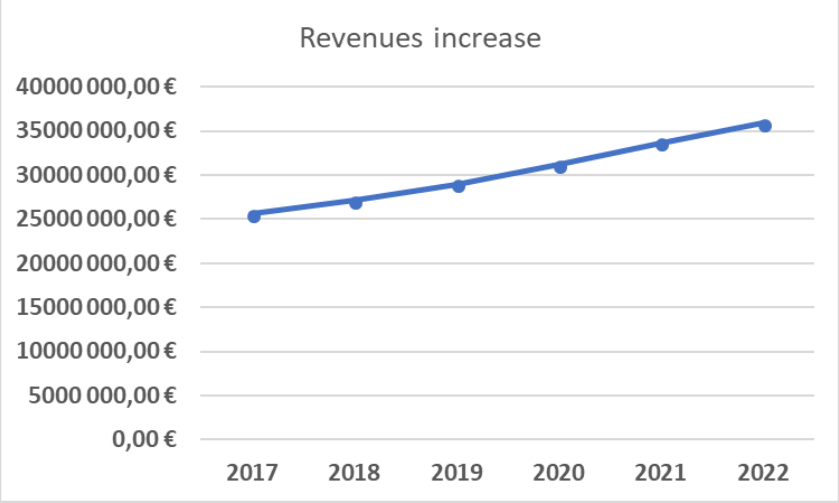


Figure 8 - Revenues forcaste for RIAM

There are two possible scenarios to respond to this business volume increase: implement the new TMS (increasing productivity and consequently installed capacity) or hire people to increase the installed capacity from the number FTE's (keeping a 1%/year increase on the productivity), figure 9.

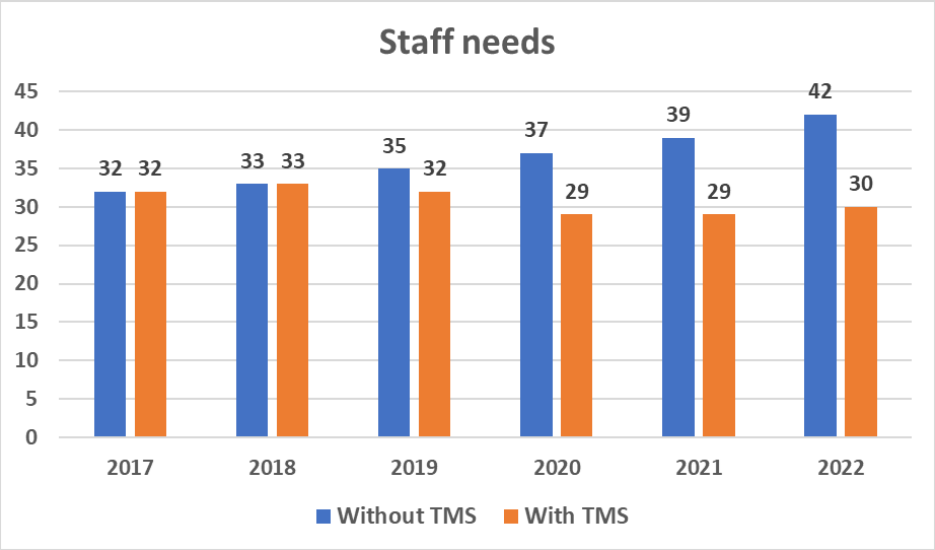


Figure 9 - Staff needs (with and without TMS)

In a scenario without TMS, accumulated costs would increase in 804 842,63 €, considering the employees that RANGEL would need to hire to respond to the business growth (30 955€ per FTE/year).

In a scenario with TMS, managing employees needs during this period it is possible to save 216 688,40 € and respond to the business growth (30 955€ per FTE/year).

6.5.4 Purchase orders and provisions

A provision is a liability of uncertain timing or amount. (PKF 2017)

A purchase order is a document that indicates to the supplier the value and the document to which the supplier must issue (with reference to) in the invoice.

With the new TMS, the goal is to guarantee the existence of provisions (introducing automatic provisions using pricelists and service requests), in our days that is not a guaranteed activity (RIAM operatives in Lisbon do not provide costs, claiming lack of time) and provisions are vital to ensure the correct management flow by the board and process rentability.

The PO's have been a new trend, implemented by the financial department of RANGEL and the existence of PO's with an automatic mechanism to verify invoices, will diminish the time lost by RIAM verifying invoices. The unique demand by RIAM is that the PO's must have the PO number as the number to be used as reference by the supplier on the invoice but must also indicate the process number that this PO refers to, to simplify the tracking process of a process by the PO.

Estimating 2 minutes to verify all the invoices that are already provided and taking into consideration all the valid invoices introduced on the bill flow (validation system in RIAM) to

validation and an operative cost of 30 955€/year, time consumption with validation of invoices will decrease in 70%, having an 0,35 FTE saving per month that represents a 10 834€ saving per year (figure 10 below, with the scenarios with and without TMS).

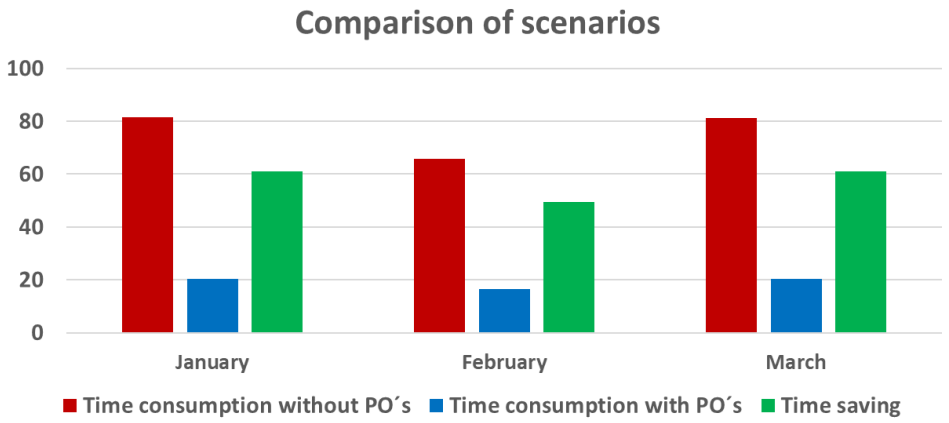


Figure 10 - Scenarios with and without POs utilization

Another important saving with the PO's is in the insurances issue process with the insurance broker, where currently in RIAM this is done by using excel to fill all the processes that need insurances, and someone must send it twice a month, and with TMS the data for these processes will be stored in a unique PO to ensure to the broker will all the processes referred on the PO. Allowing RIAM to have a saving of 0.4 FTE on this process represents 12 382€ per year.

6.5.5 A paperless RIAM

Paper usage is a trend in all the freight forwarders in Portugal, paper usage in RIAM is huge, processes are stored in paper and even emails are printed to be stored with each process.

With prospects of a rising global population, accelerating global development, increasing resource use and environmental impacts, it seems increasingly apparent that business as usual is not an option for a sustainable future. (Bocken et al. 2014) According to WWF, the world is currently using the equivalent of 1.5 planets to support human activities.

The goal with the TMS and the existence of a documental database is to diminish the environment footprint of RIAM considering the paper usage. This system will allow to generate and storage some documents directly on the system, the storage of processes on the system and to update directly documents that are received in digital format into the respective process, decreasing considerably documents that are printed to be stored (including emails) and having residual time gaining with these direct digital activities.

Regarding the original documents, they must be correctly kept by legal reasons for the period established by the law.

6.6 Leading change and recommendations

Considering organizational culture as the pattern of basic assumptions that a given group has invented, discovered, or developed in learning cope with problems of external adaptation and internal integration, and that have worked well enough to be considered valid, and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those

problems. (Schein 1984), RIAM organizational culture will have an huge influence on the TMS implementation process. In our days, this organization culture regarding their own ways of executing the process (for e.g. ignoring the importance of provisions) and excessive paper usage, will be a challenge for the board of RIAM and for the implementation team.

The leadership is very important to guarantee that operatives understand the importance of their work as little fractions as a main objective of RIAM, and that the littler fractions need to be achieved with success to achieve the main goal (the importance of the success of the group fractioned in their individual work).

As part of this leadership process it is also important to establish the correct performance indicators and to communicate intensively. Having goals and being able to compare the aimed outcomes with the performance, identifying needs and reasons to achieve goals. According to Carlos Moreira da Silva, BA Vidro Chairman, communication is the key to a strong leadership, communicating with simple messages and clear metrics. This communication must be guide by the existence of a vision for the company.

From the planning stage to the full implemented stage, there are 5 recommendations:

1. Reinforce the importance of the process to the staff (communicate intensively): Activity that has been started during the mapping process but that must continue during planning and implementation of the TMS. One important dimension to be considered on the communication with the staff is that this process of TMS strategy review, has already tried to be implemented on RIAM and failed, so operatives must understand the importance of the process and understand that now this is real and will be a reality.
2. Establish performance indicators: Performance indicators for the different sectors helping the board on the decision-making process and helping the board evaluating the staff. Key performance indicators (KPIs) and Key result indicators (KRIs), that must be aligned with the strategy, making everyone understand the importance of each task (performance indicators) on the context of the group goal (result indicators). To establish these performance indicators, it is important to join a team with knowledge, experience and credibility, and these indicators must use the events explained on 6.3.
3. Dashboards (Individual and general): Individual dashboards according to each log-in and each responsibility and general dashboards with extern visibility (separately for commercial and operational department), with the sum up and percentages for the most important data. Dashboards will use the information from the performance indicators that must establish and use the events to indicate the deadlines to the tasks, allowing the individual dashboards to show the tasks by colours according to the deadline to be done. All the information must respect principles of data integrity (accuracy and consistence of data) and data timeliness (difference between data captured and real-world event, regarding the capacity to read different information in different moments of time, without deviations or considerable deviations). It must also be defined the period of analysis to each type of information (weekly, monthly or yearly).

   Important data for the individual dashboards:

   - Commercials: Visits (made vs. planned); Quotations proposed; Quotations accepted; Quotations of clients out of date; Average of days to send a quotation.

- Operatives: Tasks by priority; Number of quotations in waiting status; Number of opened processes; Number of processes operationally closed; Number of invoices to verify; Number of processes administratively closed.
- Managers: Weekly billing compared to homologous period (by regimen, by platforms and by countries); Weekly GP (goal, done and deviation (by platforms)

Important data in the general dashboards for:

- Commercial department: Total visits (made vs. planned); Total quotations proposed; Total quotations accepted; Total quotations of clients out of date; Average of days to send a quotation.
- Operational department (splitting information by short sea, export and import): Total amount of quotations in waiting status; Total amount of opened processes; Total amount of processes operationally closed; Total amount of invoices to verify; Total amount of processes opened for more than 20 days.

All the dashboards must measure having present a benchmark of the values being measured, to guarantee the existence of an objective to be achieved when measuring the current values.

4. Implementation team: Responsible for training the staff, for testing all the components of the software during the assessment process, for software customization to RIAM needs and to verify the data quality of the information.
5. Continuous improvement team: After the implementation period in all the locations it is important to ensure the existence of a continuous improvement team to guarantee the constant update of the system and to listen and research on how to continue improving the system to achieve the company's goals.

6.7 Solutions assessment

Regarding the possible solutions, 3 solutions have been analysed and had the opportunity to present their software's to RIAM's board and to the Information Systems department of RANGEL: NaviTrans; CargoWiseone; BluJay.

According to NaviTrans website, NaviTrans Transport is a user friendly TMS software that automates, structures and optimizes the logistic processes of transport companies. The result is: faster work, more efficiently and more focus. The mission is to help company's overcoming the challenges they face, let them stand out from the competition and pave the road to success.

According to their website, CargoWise One is a single-platform software solution designed to increase company's productivity and improve integration, automation, and communication with the supply chain. It integrates company's business with their customers and partners, streamlining processes and increasing the efficiency, visibility, and profitability of operations.

According to Bjujay solutions website, BluJay's is Transportation Management for Forwarders that brings order to the chaos by automating workflow. Its comprehensive and intelligent workflow considers deadlines, milestones, date constraints, and customer priorities. The automated workflow will allow the company to manage by exception and focus on key areas of the business.

From these solutions some important features and capabilities have been chosen to be evaluated, according to RIAM's needs and each software's availability/capacity. The result of this assessment is presented in table 3 below (evaluations scale from 0 to 10 or verifying existence or not -Yes or No).

Feature/Capability	Blujay	CargowiseOne	Navitrans
Interface	8	7	5
Configurability	8	8	6
Dashboards	8	8 (via PaVE)	-
External integration	Yes	Yes	No
SAP integration	Yes	Yes	Yes
Track and trace	Yes	Yes	Yes
Information storage	Cloud/Internal	Cloud/Internal	Cloud/Internal
Support	7	5	8

Table 3 - TMS solutions assessment

Before describing all the solutions in terms of what has been assessed, it is important to explain that the contacts with the software's developers have been exploratory contacts. Considerations regarding each feature of the table:

- Interface: Bluejay has a modern (similar to applications) interface when comparing to the others. CargowiseOne also has a modern interface.
- Configurability: Blujay and Cargowiseone are in general prepared to do what RANGEL needs in terms of process. NaviTrans has some issues in fault.
- Dashboards: Blujay and Cargowiseone are in general prepared to do what RANGEL needs in terms of process, but Cargowiseone can do it through a PaVE software.
- External integration (INTTRA and CHAMP): NaviTrans does not have the integration with CHAMP (it is still under development).
- SAP integration: All of them are prepared for SAP integration.
- Track and trace: All of them have track and trace capabilities.
- Information storage: All of them can do it in cloud or internally, but internally always have integrations costs (usually it is better to use the company's providers clouds).
- Support: Depends a lot on if the implementation process is done directly with the companies or with representatives, but the Cargowiseone has a helpdesk system (with priority levels), which in case of blackouts, the company will depend on the helpdesk.

7 Conclusion and future developments

The trigger event for this dissertation was the strategy review over INFORTRANS (current TMS in usage on RIAM), splitted in three questions/phases: AS IS of the processes, TO BE/Optimization of the processes and TMS recommendations. And all the strategy review has been conducted, having present the need of transform RIAM to a partner on the supply chain of their clients and specifically the need of increasing the productivity of RIAM.

This project has culminated with the mapping (in AS IS – TO BE approach) of the air and sea processes (33 processes - import and export) on RIAM and a set of possible improvements with the TO BE process and recommendations on the new TMS implementation.

In general, this project approached the future of RIAM with the new TMS and new processes that takes RIAM to a scenario where RIAM will increase productivity (consequently diminishing costs of operatives per process), will prepare to increase the presence in new markets and offer new services to the clients (in a B2B perspective) through a participation as a partner in the value creation process of this clients, contrasting with the current scenario where RANGEL is just a service provider able to prepare boards.

Regarding the processes mapped, it was possible to progress from the AS IS process mapped (where there are many paths to perform a board depending on the operative responsible) to a scenario with an uniform and closed process, with milestones and an input-output logic (where from one phase to another, processes must have an input and generate output that will be the input of the next phase – since the request from the client as a trigger event, going through the quotation until the invoices checked that are needed to close the process). With these closed processes the interference of the operatives on the workflow to perform a shipping will be almost zero, operatives will be guided by the workflow and not use the system to help (when they what) their own workflows.

Regarding the improvements and recommendations, with the processes mapped in an AS IS approach it was possible to determinate the TO BE of the processes (through an optimization activity). Expectations of the company have been measured in terms of the productivity and the diminish of the cost per process by operative, this approach has been considered following RIAM's board expectations of increasing sales and maintaining the staff (rather than an approach of stagnate the sales and adjust the staff to the current level of sales), and from this approach the conclusion is that the savings and gains with a new TMS implementation (confirming the business increase forecast) will be high and better than keeping the current solutions and work method (without mentioning all the indirect benefits with the diminish of paper usage and the environmental footprint). Without the cost of the TMS solution, it is impossible to affirm if the TMS implementation is the correct path to follow, but the direct and indirect benefits of a new TMS implementation are huge.

On all this process, organizational culture had and will always have an important role. The paper usage represents the peak of the organizational culture, where everything is printed. And the only way of solving this issue is to ensure a correct leadership take over process, establishing a vision and communicating with the operatives constantly. Digitization and footprint takeover have been also an important gain obtained with this project, digitization trends through the automatisms created by the TO BE process, proved that with the TMS implementation it will be possible to have a paperless RIAM, saving money with paper, toners and printers, and having a more environmentally friendly company.

Summing up, this project contributes with an AS IS – TO BE mapping approach aiming a TMS implementation on freight forwarders, confirming that despite all the constraints and challenges regarding organizational culture, the TMS implementation on RIAM will allow to increase productivity and uniformize the processes, increasing the service level (guaranteeing data quality and data timeliness) to be used on the decision-making process, allowing a management by exception (looking to the problems more directly), with higher integrity of the data (concerning the GDPR), allowing to have early and automatically data of the company sorted by different criteria.

The implementation process is not an end in itself, but a beginning of a world of opportunities for RIAM. With this TMS takeover, RIAM can redefine its vision and long-term goals, modernize their process acting as their client's partner and have a better analysis system being inside new technology trends on the freight forwarder activity. This TMS must be used as the tool for the RIAM evolution and capacity to go along the trends on the freight forward and logistics world. Regarding market forecast evolution, and logistic and freight forwarder trends, with this project it is possible to affirm that in terms of direct and indirect gains, the TMS is the best solution for RIAM to respond to the market.

In terms of future developments, from this project emerge two main possibilities for future developments: on the TMS implementation and on new trends.

Regarding the TMS implementation, to ensure the goal of having a closed system and to guarantee a correct implementation process it is important to establish workflows (as the steps to systematize a business processes regarding automation, responsibilities and timings) for each case that will be running on the TMS and identify what are the fields that each document generated by the system must contain. The workflows must be done directly with the operatives being guide by the goals of RIAM's board and the TMS chosen, and this will be important to diminish the TMS's implementation time and to ensure that the system will correspond to the needs and expectations of the company (guaranteeing a closed system, where operatives cannot decide where to begin the process). And the documents fields identification, must be done internally with the operatives and the RIAM board, and it will be important to ensure that the documents will be adapted to RIAM reality and needs, and to guarantee the input-output logic (it is important to ensure that certain type of information have been fulfilled to continue the process to another operative).

Regarding the new trends, an important analysis on RIAM is to analyse possible displacement of tasks (low value activities with the possibility of displacement of activities to countries with a better cost/quality ratio regarding these activities) and use of a blockchain concept, that must be studied with TMS providers (for example to be used with the bill of landings or the pre-alerts).

References

"Business dictonary." accessed 15/05/2018. http://www.businessdictionary.com.

"Freightquote: Transportation Management System (TMS) definition." accessed 28/06/2018. https://www.freightquote.com/define/what-is-transportation-management-system-tms.

"Gartner: Transport Management System (TMS)." accessed 15/05/2018. www.gartner.com/it-glossary/tms-transportation-management-system.

"Oxford Advanced Learners Dictionary." accessed 05/06/2018. http://www.businessdictionary.com.

"RANGEL." accessed 15/05/2018. www.rangel.com.

Aguilar-Savén, Ruth Sara. 2004. "Business process modelling: Review and framework." *International Journal of Production Economics* 90 (2):129-149. doi: https://doi.org/10.1016/S0925-5273(03)00102-6.

Bocken, N. M. P., S. W. Short, P. Rana, and S. Evans. 2014. "A literature and practice review to develop sustainable business model archetypes." *Journal of Cleaner Production* 65:42-56. doi: https://doi.org/10.1016/j.jclepro.2013.11.039.

Brussee, Rogier, and Peter H. T. de Groot. 2016. "An online tool for business modeling and a refinment of the business canvas." Utrecht.

Chiang, Alexander. 2009. "Creating Dashboards: The players and collaboration you need for a sucesuful project." *Business Inteligence Journal*, 64.

Chinosi, Michele, and Alberto Trombetta. 2012. "BPMN: An introduction to the standard." *Computer Standards & Interfaces* 34 (1):124-134. doi: 10.1016/j.csi.2011.06.002.

Chow, Harry K. H., K. L. Choy, and W. B. Lee. 2007. "A strategic knowledge-based planning system for freight forwarding industry." *Expert Systems with Applications* 33 (4):936-954. doi: https://doi.org/10.1016/j.eswa.2006.08.004.

Eckerson, Wayne W. 2009. "Perfomance Managment Strategies." *Business Inteligence Journal*, 65.

Guedes, Alcibíades Paulo. 2017. "Corporate strategy slides." FEUP.

Horenberg, Daan. 2017. "Applications within Logistics 4.0: Vision of 3PL service provider." 9th IBA Bachelor Thesis Conference, Enschede, The Netherlands.

Jeyaraj, Anand, and Vicki L. Sauter. 2014. "Validation of business process models using swimlane diagrams." *Journal of Information Tehcnology Managment*:27-37.

Kelepouris, Thomas, Samuel Bloch Da Silva, and Duncan McFarlane. 2006. Automatic ID Sytems: Enablers for Track and Trace Performance. Auto-ID Labs.

Lai, Kee-hung, Christina W. Y. Wong, and T. C. E. Cheng. 2010. "Bundling digitized logistics activities and its performance implications." *Industrial Marketing Management* 39 (2):273-286. doi: 10.1016/j.indmarman.2008.08.002.

Markovitch, Shahar, and Paul Willmott. 2014. "Accelerating the digitization of business processes." *Corporate Finance Practice*, 4.

Parmenter, David. 2014. How to implement ´winning KPIs´.

Petersen, Niels Hackius; Moritz. 2017. "Blockchain in Logistics and Supply Chain: Trick or treat ?" Digitalization in Supply Chain Management and Logistics, Hamburg.

PKF. 2017. Ias 37 Provisions, Contingent Liabilities and Continegent Assets. In *Accounting Summary*: PKF.

Sadouskaya, Krystsina. 2017. "Adoption of Blockchain Technology in Supply Chain and Loogsitics." Bacheler, Business logistics, XAMK.

Schein, Edgar. 1984. *Coming to A New Awareness of Organisational Culture*. Vol. 25.

Teixeira, Pedro. 2017. "IRP slides: Types of study." FEUP.

Walliman, Nicholas. 2011. *Reserach Methods - The basics*. New York: Taylor & Francis Group e-Library.

APPENDIX A: Semi-structured interviews on the AS IS mapping process

Sea and Air freight

Questions:

1. What is your view of the process/activities in the Sea Freight?
2. What are your phase and your responsibilities in RIAM?
3. Where does your part start and end? Which documents it generates?
4. Which activities you consider important to digitize and improve?

APPENDIX B: Dashboard definition semi-structed interviews

Dashboard definition

"Dashboard that makes their lives easier"

End users -> Data examined -> Dashboard solution

Chiang (2009)

Groups of users: Commercial; Operational – Export; Operational – Import; Board.

(Oral interviews)

Question 1: If you had to pick up your top 5 business metrics, what would they be?

Important feedback: KPIs and the supporting metrics behind them.

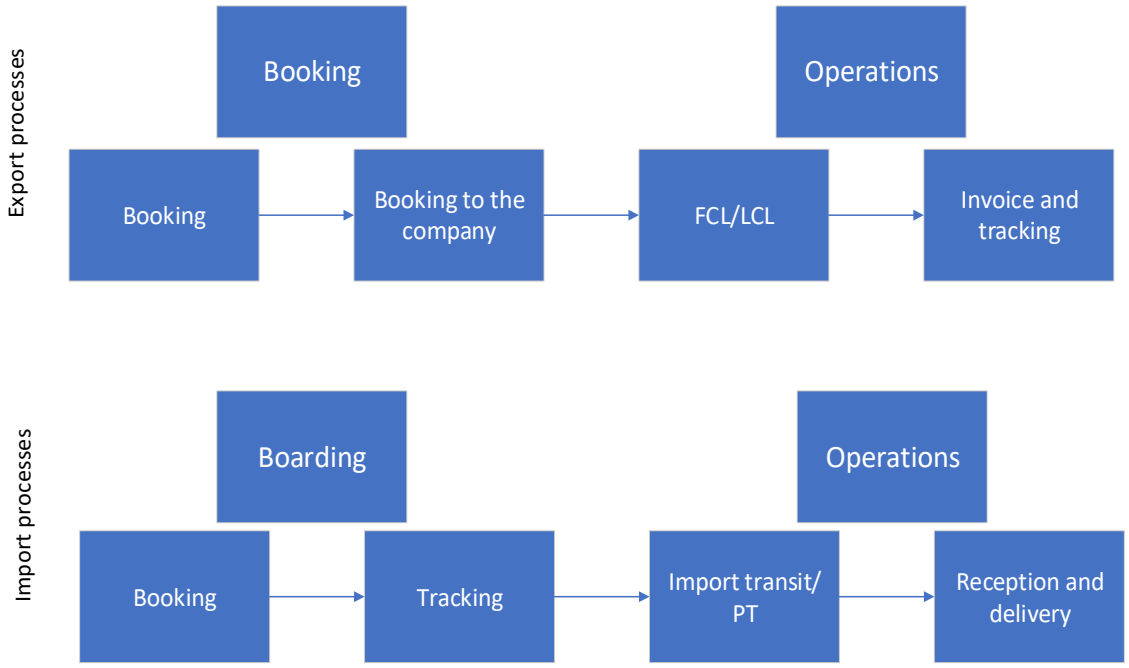
Question 2: How do these business metrics enable you to make informed decisions?

Important feedback: How users employ the data.

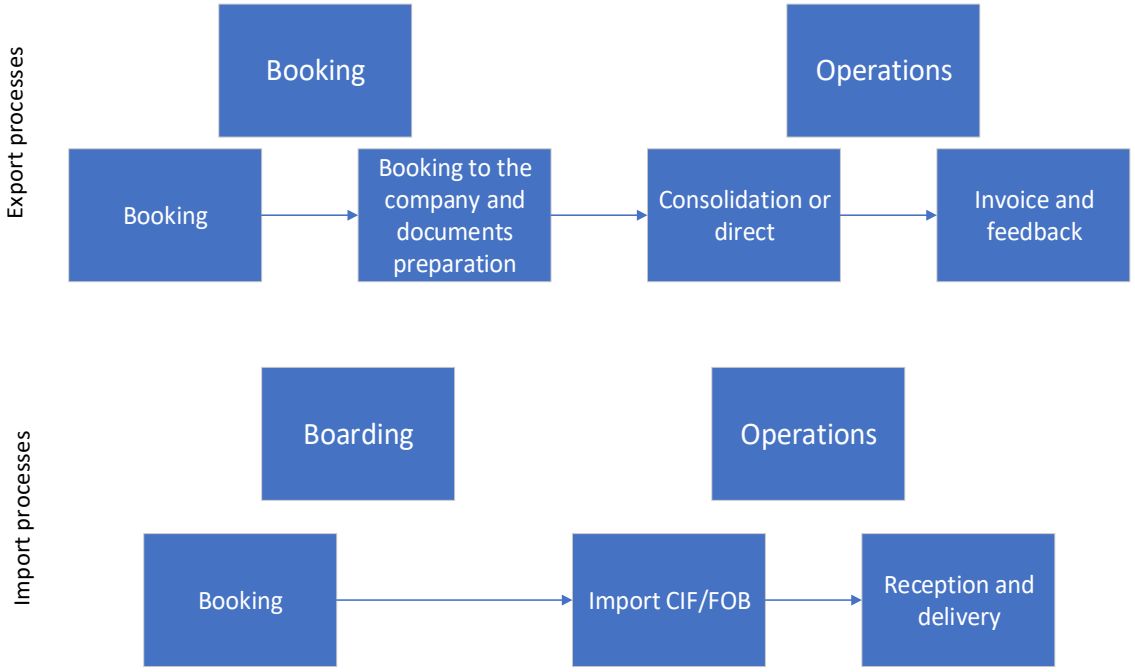
Question 3: How frequently do you need this data to be updated?

Important feedback: Real time; Near real time; Longer fixed interval.

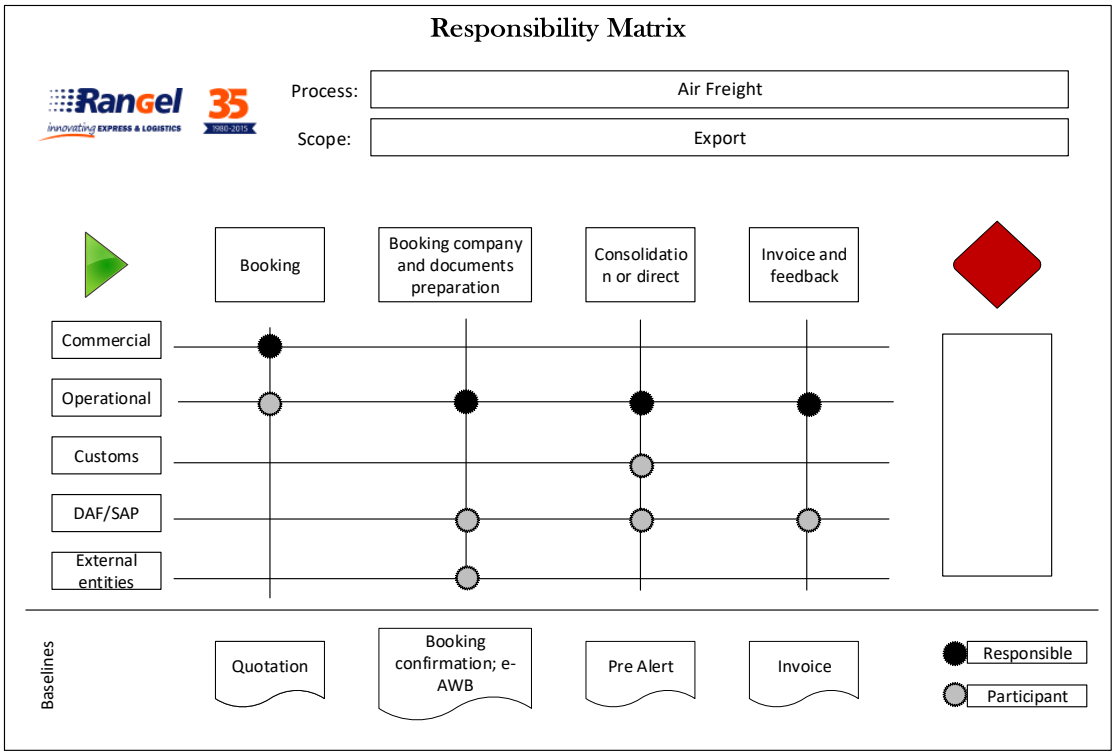
APPENDIX C: RIAM processes map (Sea)

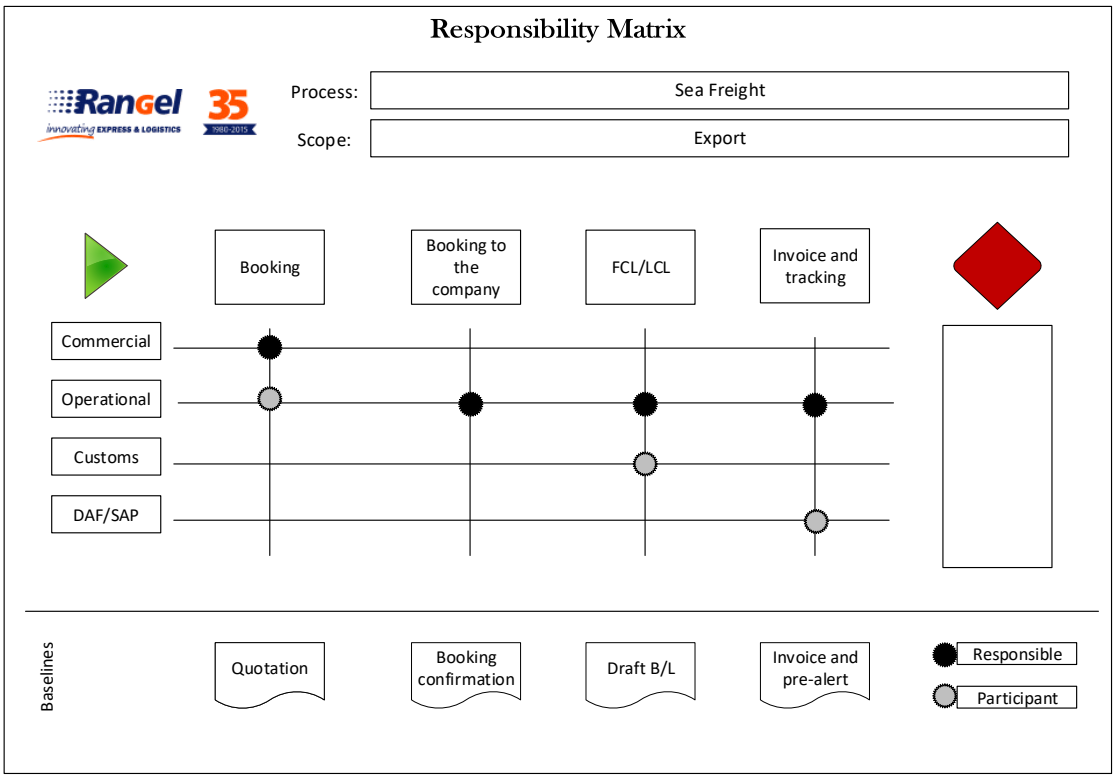


APPENDIX D: RIAM processes map (Air)

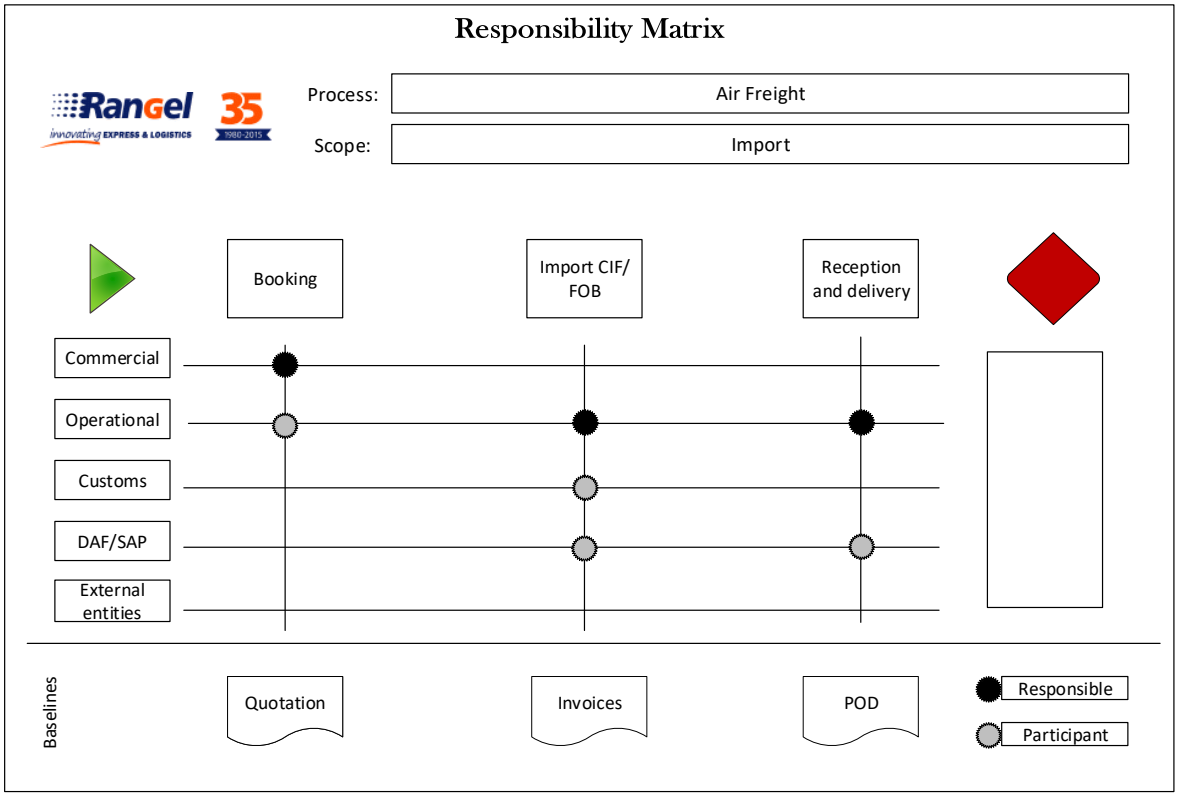


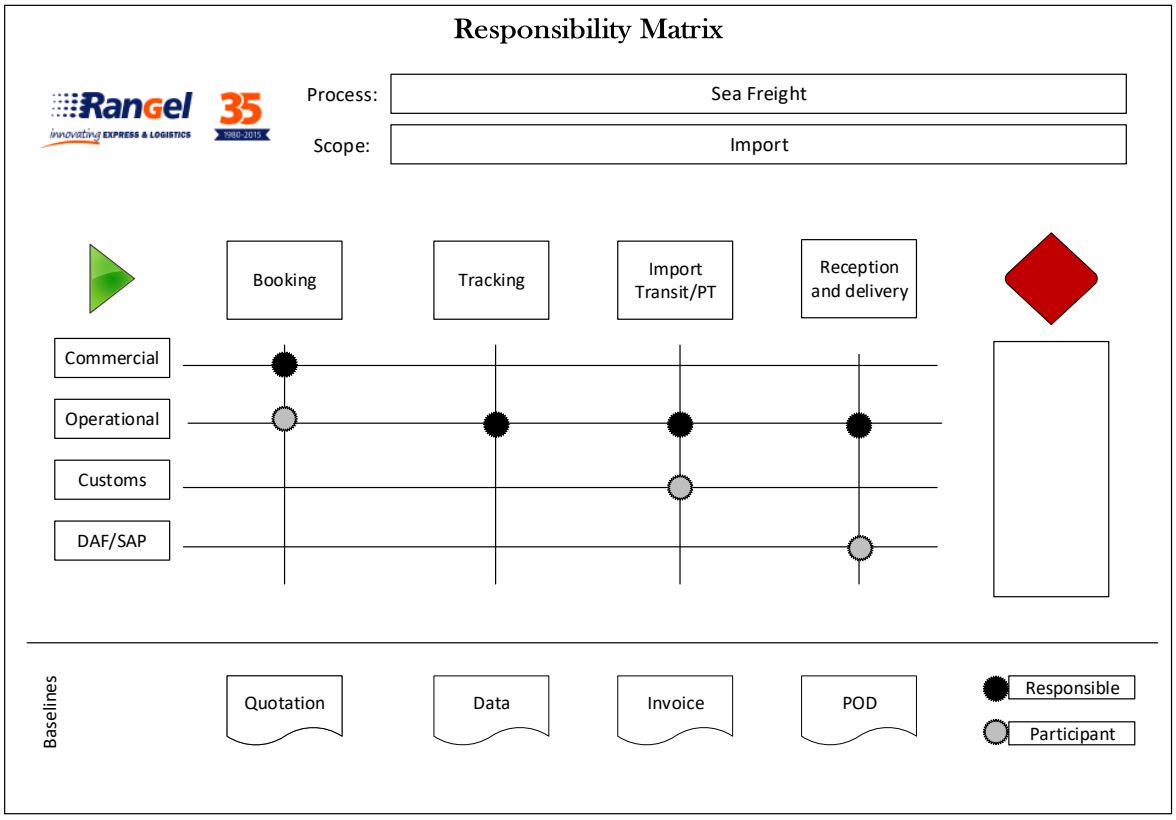
APPENDIX E: RIAM responsibilities matrix (Export)




Responsibility Matrix
Process:
Sea Freight
Scope:
Export
Booking
Booking to the company
FCL/LCL
Invoice and tracking
Commercial
Operational
Customs
DAF/SAP
Baselines
Quotation
Booking confirmation
Draft B/L
Invoice and pre-alert
Responsible
Participant

APPENDIX F: RIAM responsibilities matrix (Import)




Responsibility Matrix
Process:
Sea Freight
Scope:
Import
Booking
Tracking
Import Transit/PT
Reception and delivery
Commercial
Operational
Customs
DAF/SAP
Baselines
Quotation
Data
Invoice
POD
Responsible
Participant

APPENDIX G: AS IS Processes mapped

Air

- Booking – Booking process by the client for exportation and importation, and internal procedures to send the quotation.

- Consolidation – Booking to the air company, documents preparation, loading and sending the documentation – process with an agent.
- AWB Direct - Booking to the air company, documents preparation, loading and sending the documentation – process without an agent.
- Invoice and feedback – Invoice customer, provision costs and inform customer.

- Import CIF – Documents preparation - With insurance
- Import FOB - Documents preparation - Without insurance
- Reception and delivery - Goods delivery and cost provision.

Sea

- Booking - Booking process by the client for exportation and importation, and internal procedures to send the quotation.

- Booking to the company – Booking to the transportation company.
- FCL- Documents preparation and loading on the client.
- FCL-Rangel – Documents preparation and loading on the RANGEL warehouse.
- LCL -Documents preparation and loading on the RANGEL warehouse.
- LCL-Co-loader – Documents preparation and loading on the co-loader.
- Invoicing and tracking – Final documents issue and cost provision.

- Tracking – Tracking of the vessel until arrives and insurance issue if needed.
- Import transit- Documents preparation with clearance procedures in the port of transhipment and invoicing procedures to the client.
- Import PT – Documents preparation with clearance procedures in Portugal and invoicing procedures to the client.
- Reception and delivery – Goods pickup and delivery.

APPENDIX H: TO BE Processes mapped

Air

- Pre-boarding -Booking by the client for exportation and importation, and internal procedures to send the quotation.

- Booking company and documents preparation – Booking to the air companies and preparation of the documents.
- Consolidation or direct – Loading and send documentation (clearance) to send the goods.
- Invoice and feedback – Invoice the client and track the shipment.

- Import CIF/FOB – Documents preparation
- Reception and delivery – Goods pickup and delivery

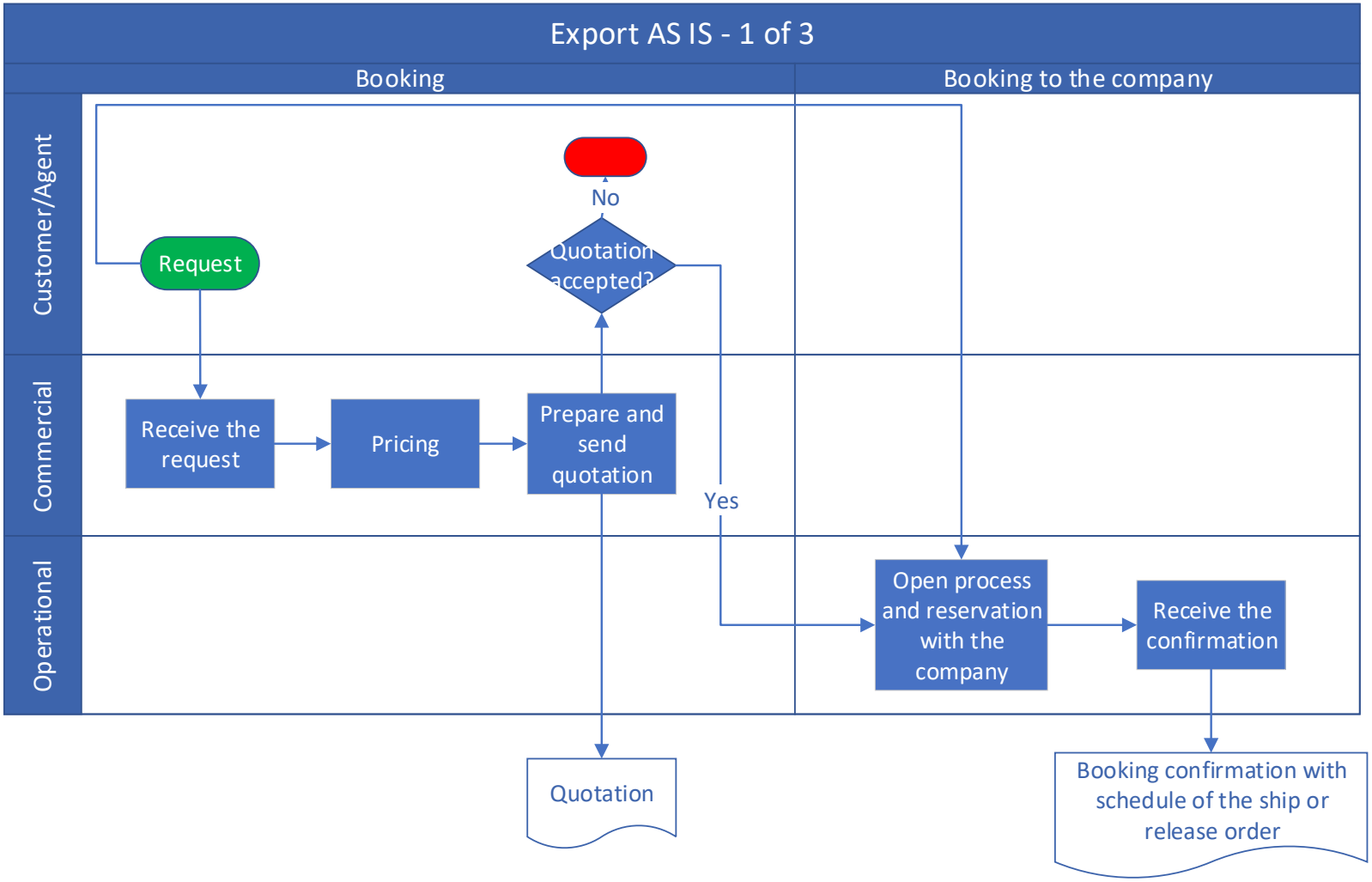
Sea

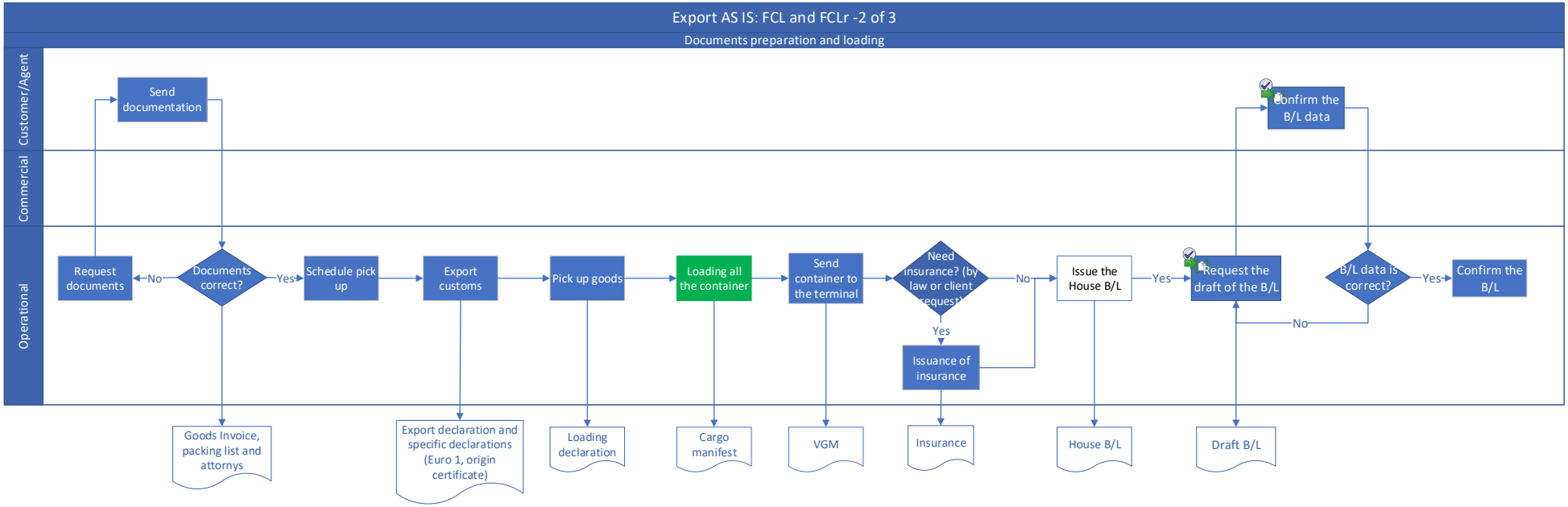
- Booking – Booking by the client for exportation and importation, and internal procedures to send the quotation.

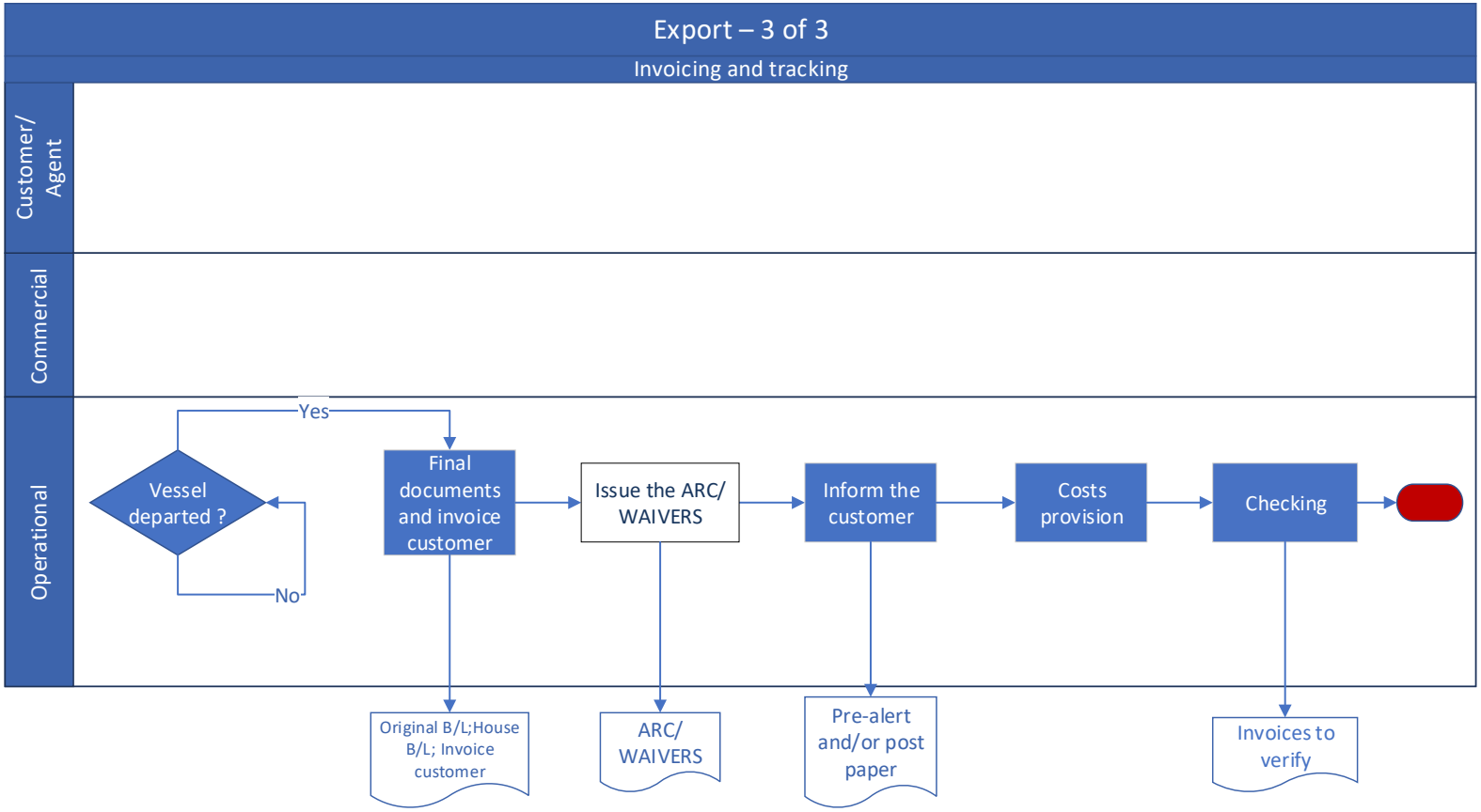
- Booking to the company – Booking to the transportation company.
- FCL/FCL-Rangel – Documents preparation.
- LCL/LCL-Co-loader – Documents preparation.
- Invoicing and tracking – Final documents issue and pre-alert sending.

- Tracking – Open booking, tracking of the vessel until arrives and insurance issue if needed.
- Import transit - Documents preparation with clearance procedures in the port of transhipment and invoicing procedures to the client.
- Import PT – Documents preparation with clearance procedures in Portugal and invoicing procedures to the client.
- Reception and delivery - Goods pickup and delivery.

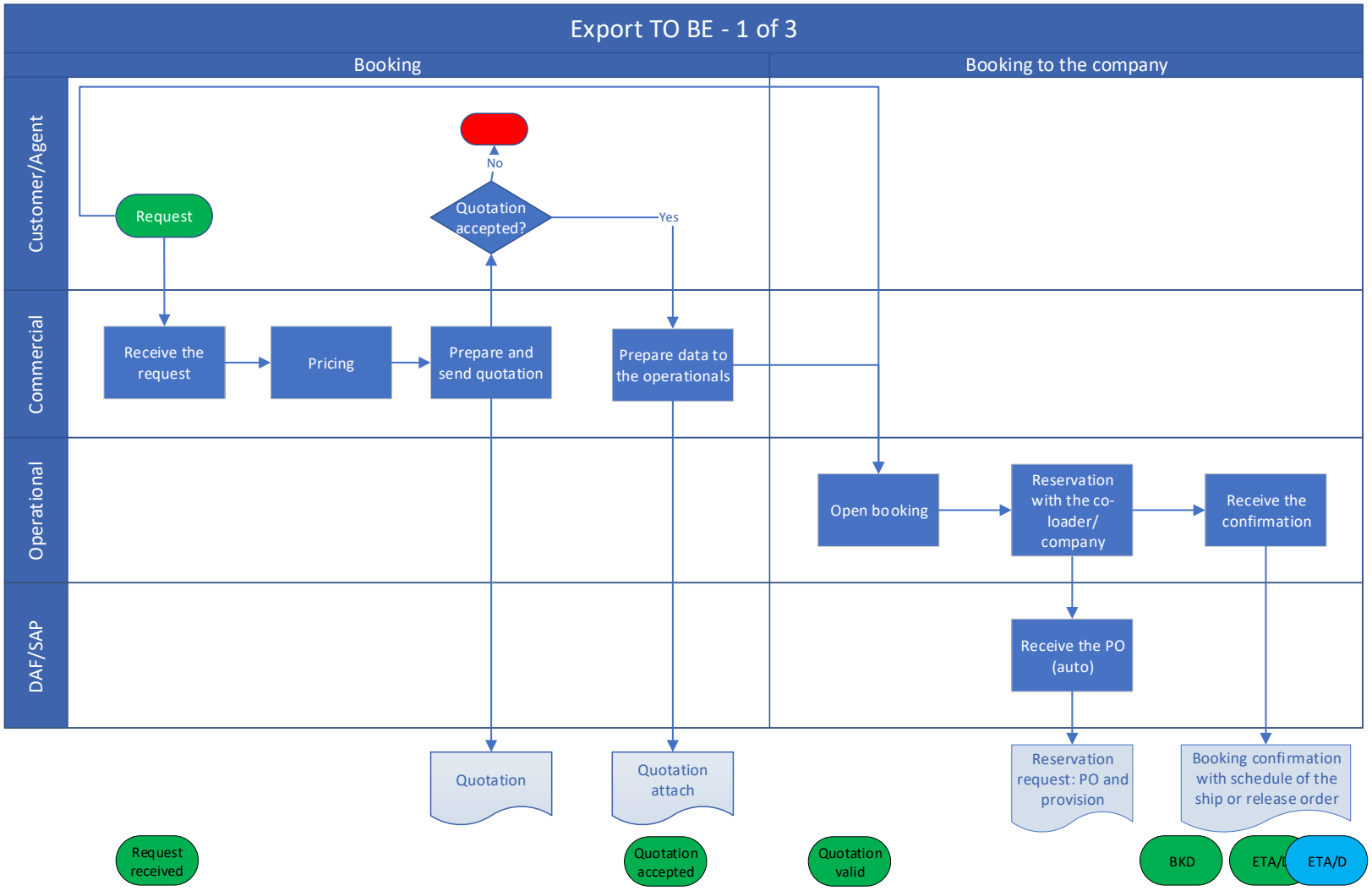
APPENDIX I: Use case – Export FCL AS IS

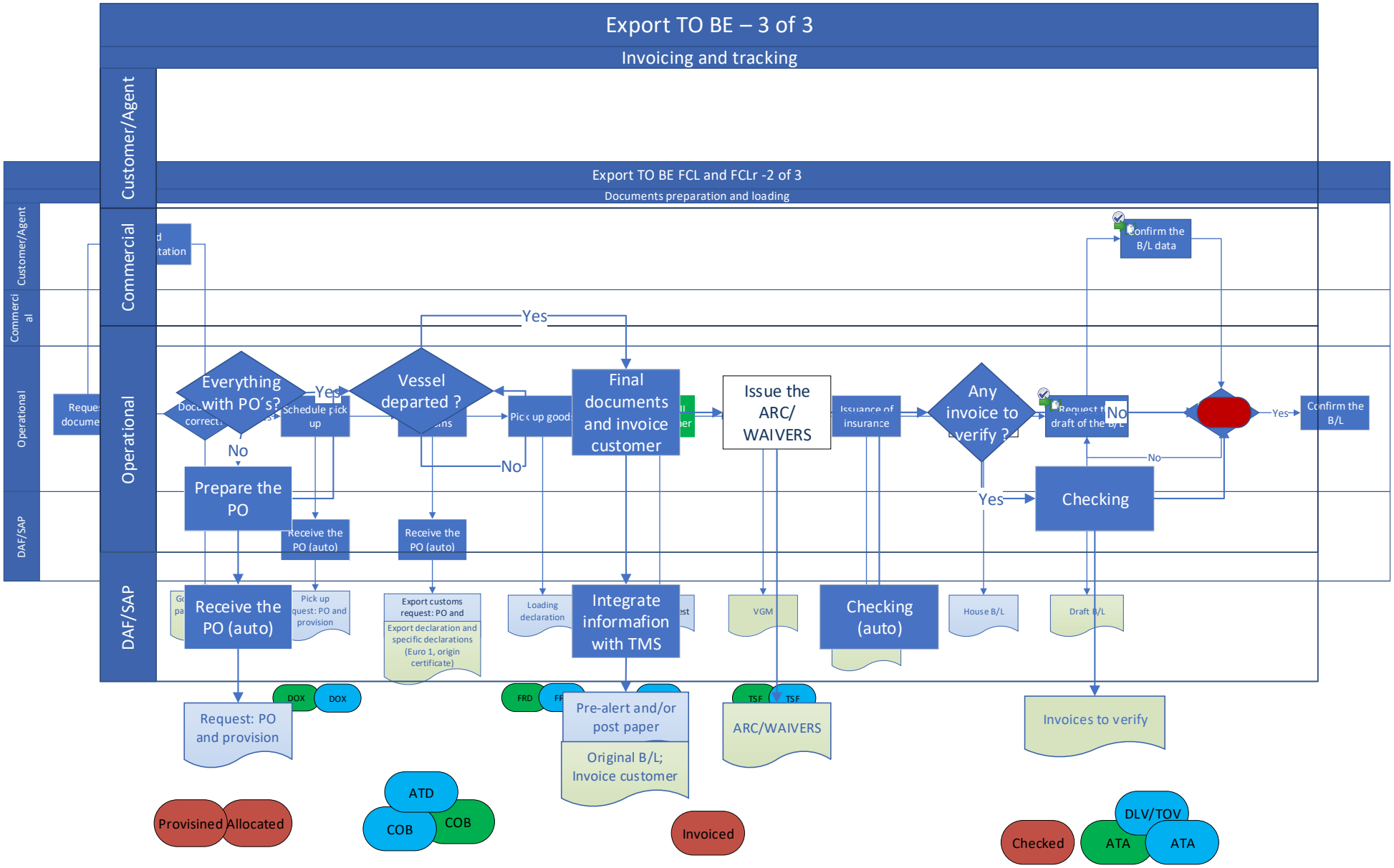



Export AS IS: FCL and FCLr -2 of 3
Documents preparation and loading
Customer/Agent
Commercial
Operational
Send documentation
Request documents
No
Documents correct?
Yes
Schedule pick up
Export customs
Pick up goods
Loading all the container
Send container to the terminal
Need insurance? (by law or client request)
No
Yes
Issuance of insurance
Issue the House B/L
Yes
Request the draft of the B/L
Confirm the B/L data
B/L data is correct?
No
Yes
Confirm the B/L
Goods Invoice, packing list and attornys
Export declaration and specific declarations (Euro 1, origin certificate)
Loading declaration
Cargo manifest
VGM
Insurance
House B/L
Draft B/L

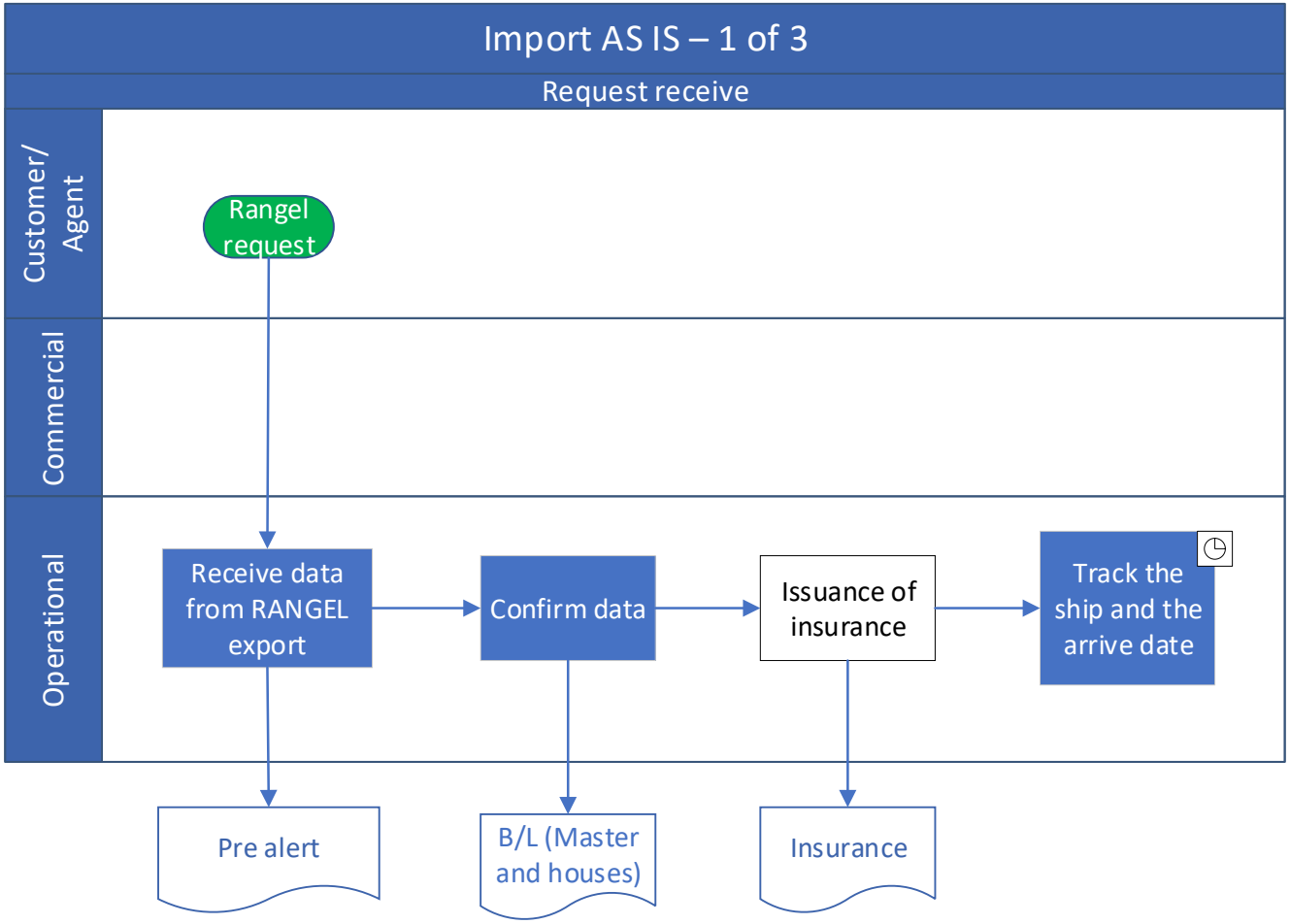

Export – 3 of 3
Invoicing and tracking
Customer/ Agent
Commercial
Operational
Vessel departed ?
Yes
No
Final documents and invoice customer
Issue the ARC/ WAIVERS
Inform the customer
Costs provision
Checking
Original B/L;House B/L; Invoice customer
ARC/ WAIVERS
Pre-alert and/or post paper
Invoices to verify

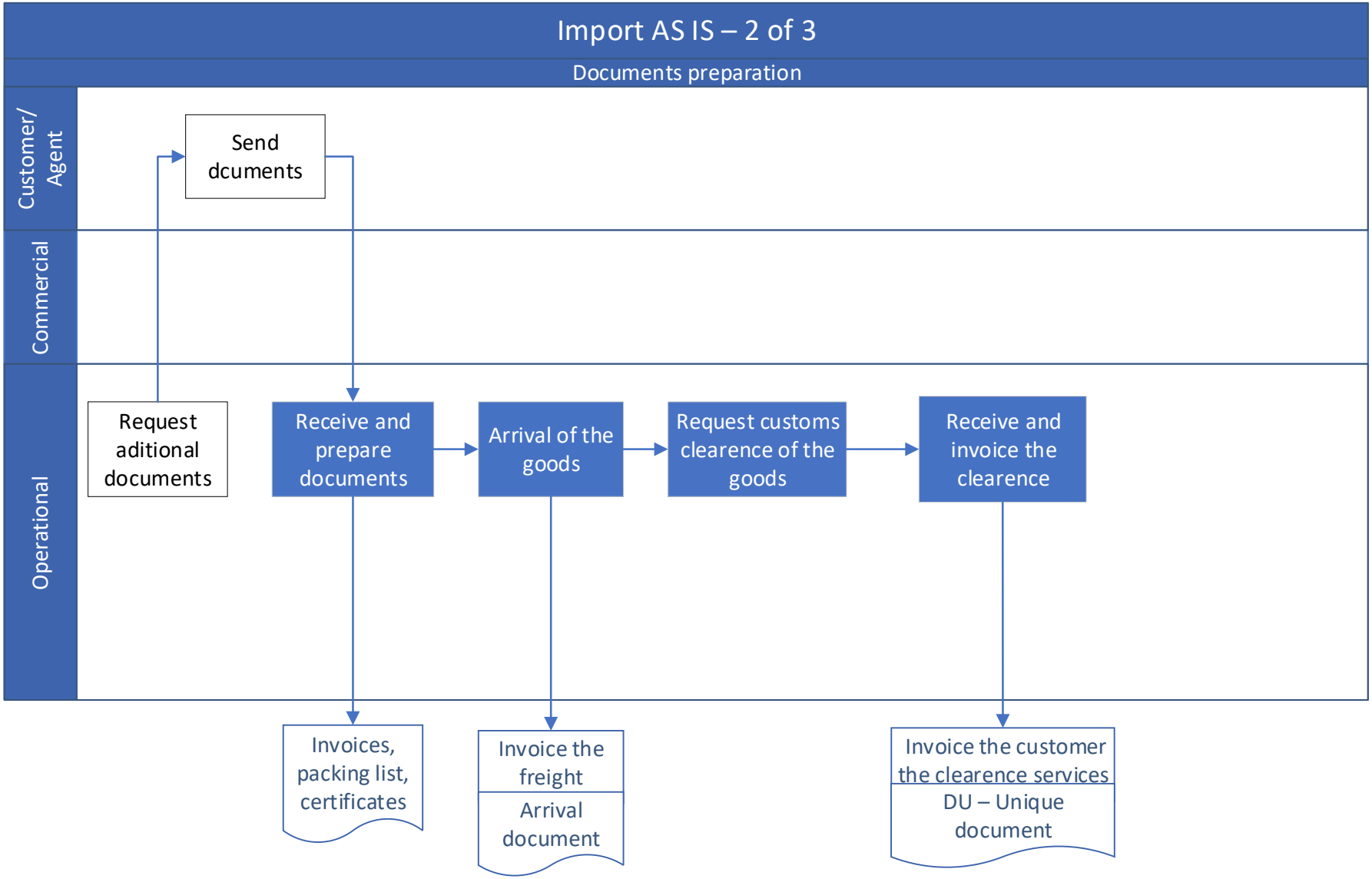
APPENDIX J: Use case – Export FCL TO BE

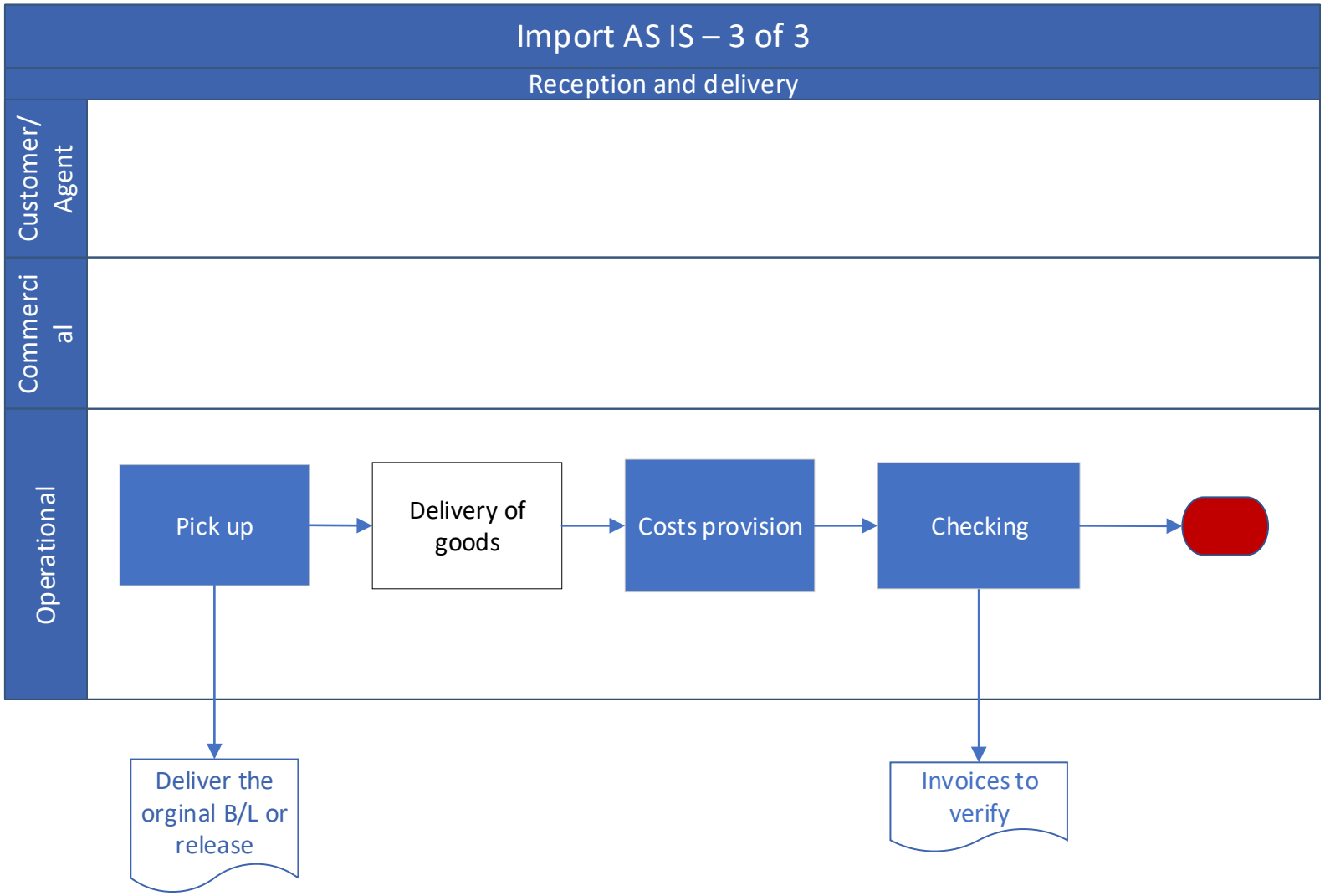



Export TO BE – 3 of 3
Invoicing and tracking
Customer/Agent
Commercial
Operational
DAF/SAP
Export TO BE FCL and FCLr -2 of 3
Documents preparation and loading
Customer/Agent
Commercial
Operational
DAF/SAP
Confirm the B/L data
Yes
Everything with PO´s?
No
Yes
Schedule pick up
Vessel departed ?
No
Pick up good
Final documents and invoice customer
Issue the ARC/ WAIVERS
Issuance of insurance
Any invoice to verify ?
No
Yes
Confirm the B/L
No
Prepare the PO
Receive the PO (auto)
Receive the PO (auto)
Checking
Receive the PO (auto)
Pick up quest: PO and provision
Export customs request: PO and
Export declaration and specific declarations (Euro 1, origin certificate)
Loading declaration
Integrate informafion with TMS
VGM
Checking (auto)
House B/L
Draft B/L
DOX
DOX
FRD
TSF
TSF
Request: PO and provision
Pre-alert and/or post paper
Original B/L; Invoice customer
ARC/WAIVERS
Invoices to verify
Provisined
Allocated
ATD
COB
COB
Invoiced
Checked
DLV/TOV
ATA
ATA

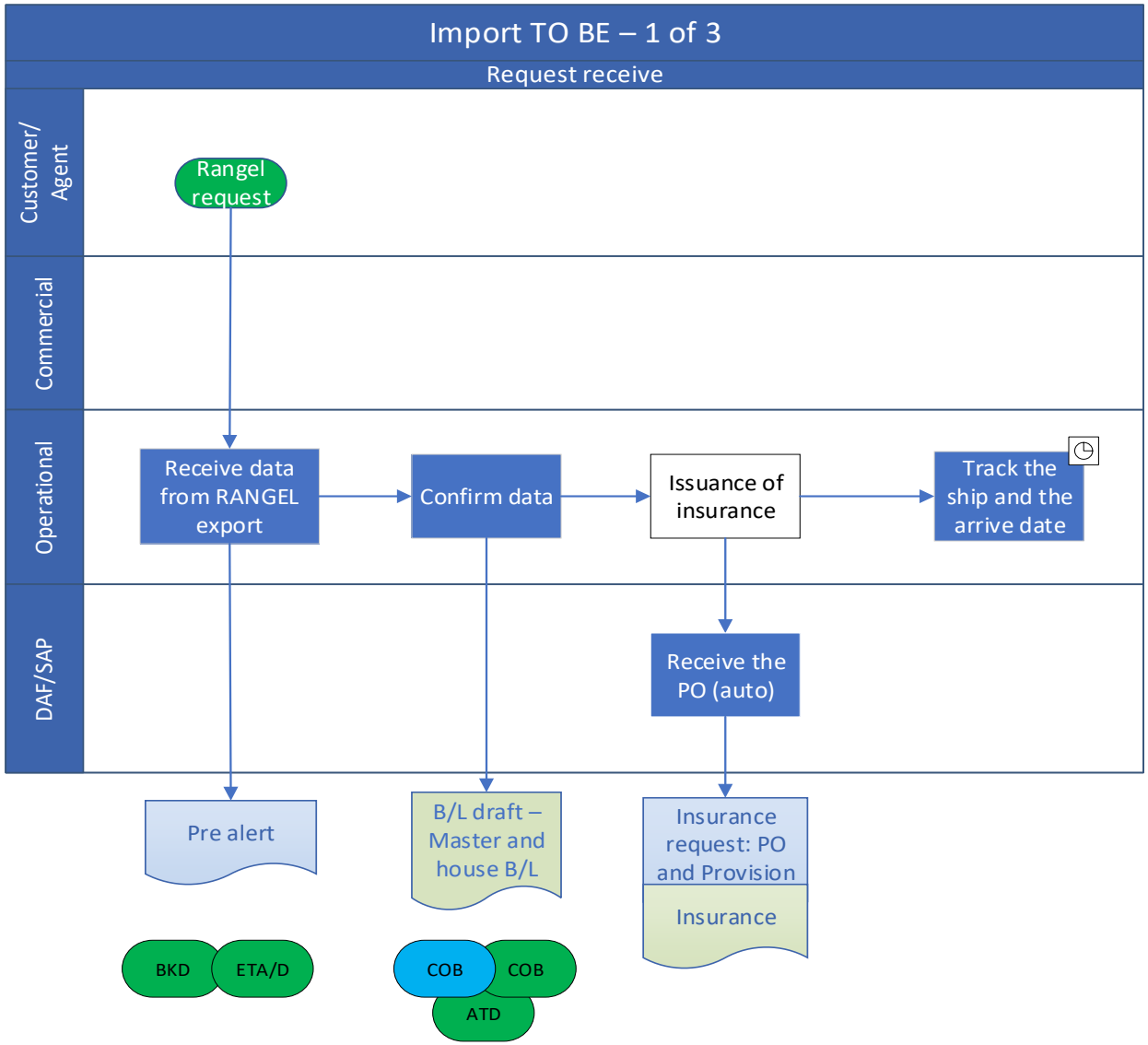
APPENDIX K: Use case – Import FCL AS IS

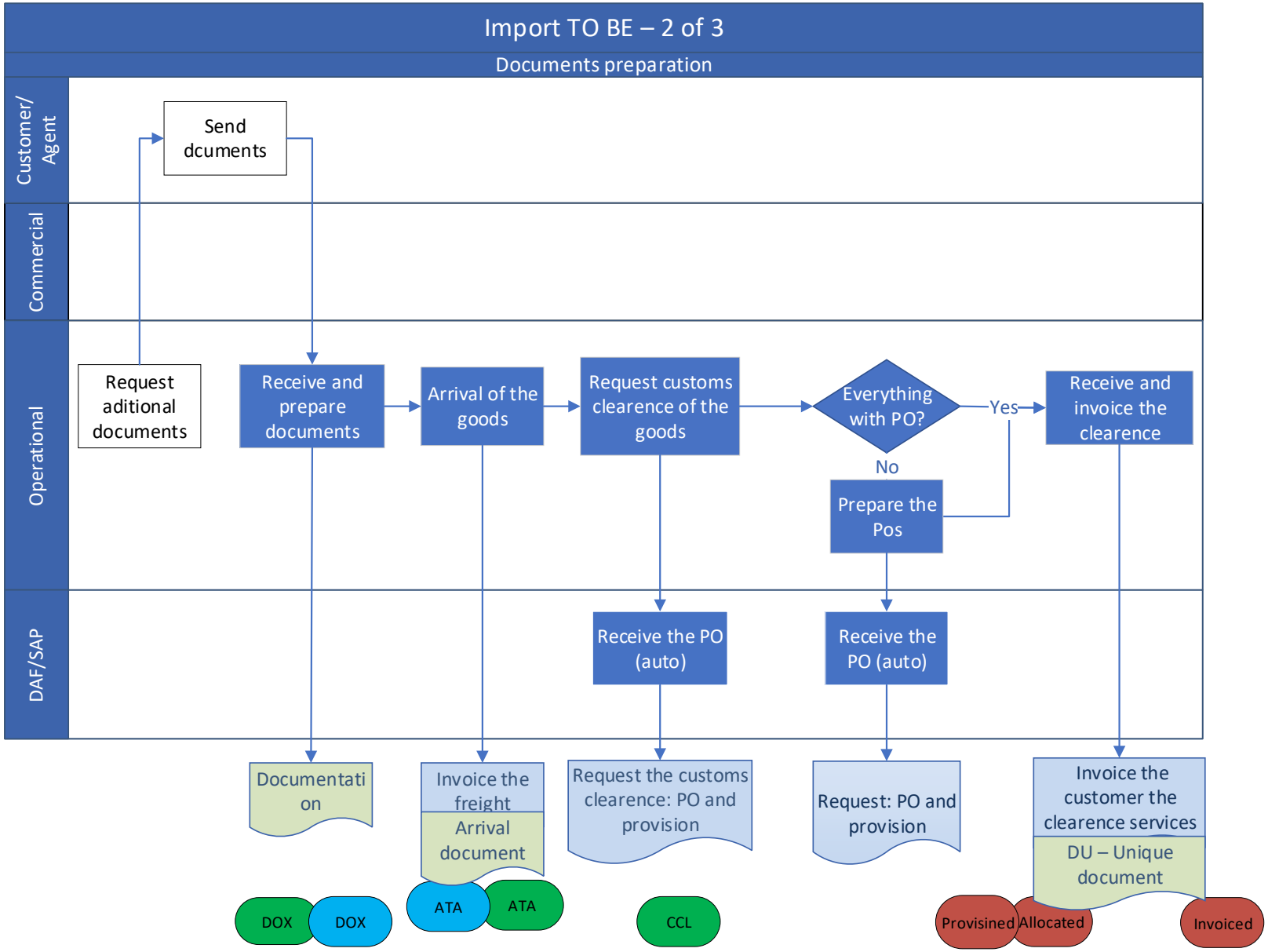


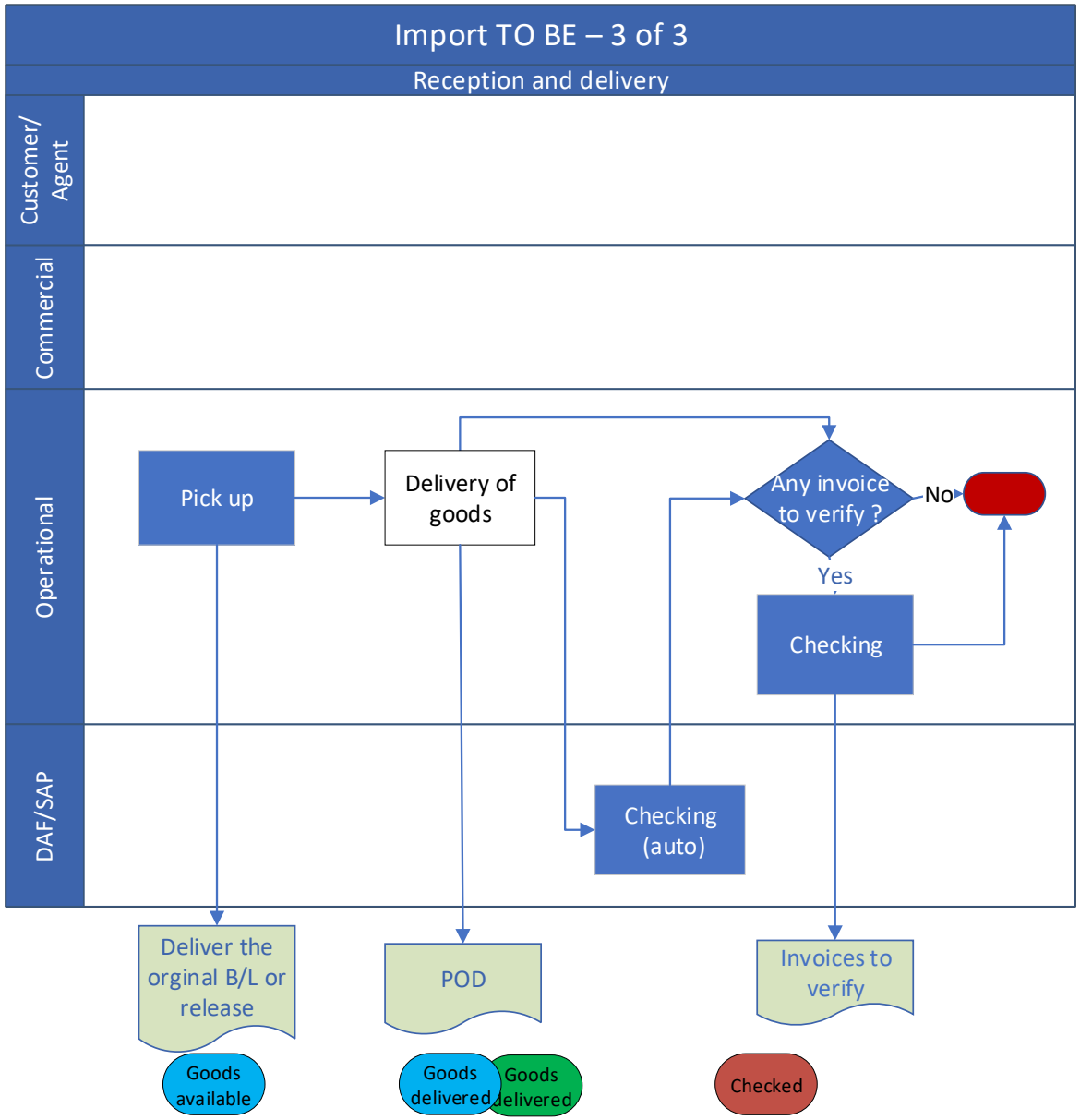

Import AS IS – 2 of 3
Documents preparation
Customer/ Agent
Commercial
Operational
Send dcuments
Request aditional documents
Receive and prepare documents
Arrival of the goods
Request customs clearence of the goods
Receive and invoice the clearence
Invoices, packing list, certificates
Invoice the freight
Arrival document
Invoice the customer the clearence services
DU – Unique document


Import AS IS – 3 of 3
Reception and delivery
Customer/ Agent
Commercial
Operational
Pick up
Delivery of goods
Costs provision
Checking
Deliver the orginal B/L or release
Invoices to verify

APPENDIX L: Use case – Import FCL TO BE




Import TO BE – 2 of 3
Documents preparation
Customer/ Agent
Commercial
Operational
DAF/SAP
Send dcuments
Request aditional documents
Receive and prepare documents
Arrival of the goods
Request customs clearence of the goods
Everything with PO?
Yes
No
Receive and invoice the clearence
Prepare the Pos
Receive the PO (auto)
Receive the PO (auto)
Documentati on
Invoice the freight
Arrival document
Request the customs clearence: PO and provision
Request: PO and provision
Invoice the customer the clearence services
DU – Unique document
DOX
DOX
ATA
ATA
CCL
Provisined
Allocated
Invoiced


Import TO BE – 3 of 3
Reception and delivery
Customer/ Agent
Commercial
Operational
DAF/SAP
Pick up
Delivery of goods
Any invoice to verify ?
No
Yes
Checking
Checking (auto)
Deliver the orginal B/L or release
POD
Invoices to verify
Goods available
Goods delivered
Goods delivered
Checked