2017

Moving Forward

FINAL PROJECT REPORT

JANA TAUTE 14040639

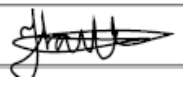
University of Pretoria

ANTI-PLAGIARISM PAGE

I, Jana Taute, hereby declare on 28 September 2017 that I agree to all statements in the below declaration and that the work done for this BPJ 420 final report is my own.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

DEPARTEMENT BEDRYFS- EN SISTEEMINGENIEURSWESE
DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

VOORBLAD VIR INDIVIDUELE WERKOPDRAGTE - 2016 FRONT PAGE FOR INDIVIDUAL ASSIGNMENTS - 2016	
Persoonlike besonderhede / Personal details	
Studentenommer **Student number**	14040639
Voorletters en van **Initials and surname**	J, Taute
Titel **Title**	Me.
Selnommer **Cell number**	0823871071
Werkopdrag / Assignment	
Modulekode **Module Code**	BPJ 420
Werkopdragnommer **Assignment number**	
Onderwerp **Subject**	Final year project
Dosent **Lecturer**	Dr. Marne de Vries
Datum **Date**	September, 2017
Verklaring / Declaration	
1. Ek begryp wat plagiaat is en is bewus van Universiteitsbeleid in hierdie verband 2. Ek verklaar dat hierdie my eie oorspronklike werk is 3. Waar iemand anders se werk gebruik is (hetsy uit 'n gedrukte bron, die internet of enige ander bron), is dit behoorlik erken en die verwysings ooreenkomstig departementele vereistes gedoen 4. Ek het nie 'n ander student se vorige werk gebruik en as my eie ingedien nie 5. Ek het niemand toegelaat en sal niemand toelaat om my werk te kopieer met die doel om dit as sy of haar eie werk voor te hou nie	
1. I understand what plagiarism is and I am aware of the University's policy in this regard. 2. I declare that this is my own original work 3. Where other people's work has been used (either from a printed source, internet or any other source) this has been carefully acknowledged and referenced in accordance with departmental requirements 4. I have not used another student's past work to hand in as my own 5. I have not allowed and will not allow, anyone to copy my work with the intention of handing it in as his/her own work	
Handtekening **Signature**	

EXECUTIVE SUMMARY

This document is the final project report for a final year project in the Department of Industrial and Systems Engineering, module code BPJ 420.

Company ABC is a company that started out as a family-owned business in 1993. Despite an annual growth of 21% for the last three years, a recent survey showed deterioration in customer service. As customer satisfaction is vital to sustainable growth of the company, the underlining problems to poor customer service are identified and quantified in the project motivation and problem analysis.

Business process management (BPM) is identified as an appropriate theoretical area in industrial engineering to deal with the process inefficiencies causing the decline in customer service. Information system design (ISD), operations research (OR) and the quick changeover philosophy single minute exchange of die (SMED) are identified to semi-automate and optimise some of the processes within the company to enhance customer service.

A literature study is done on the above mentioned theoretical contexts and their corresponding project approaches. Problem analysis is done using the drivers and triggers for a BPM related project identified in the literature study, as well as the PIECES analysis used to identify information system (IS) related projects.

The requirements elicitation is done, where the appropriate strategy with its process architecture is developed with initial BPMN process models and the basic enterprise construction. Corporate strategy is developed using strategic analysis tools, like PESTEL analysis, Porter's five forces and value disciplines. The balanced scorecard approach is used to identify appropriate measures for the chosen strategy.

The requirements serve as a foundation for the solution selection where a cost-benefit analysis indicates that implementing the new business processes, especially those involving the IS and SMED, could potentially increase the overall quote acceptance rate by 20% and reduce costs by R 411 550.00 annually.

BPMN and SMED are used to construct the new process models in the solution construction. These process models are developed with corresponding training manuals for the expanded IS, role descriptions with specific KPIs and customer communication scripts.

The implementation approach is discussed with some findings as conclusion. Since the evaluation results were obtained only a month after implementation, some of the expected long-term benefits have not been fully realised. The company did however experience an immediate 28.9% growth in revenue from the corresponding month of the previous year with further benefits discussed in the conclusion and recommendations.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Abbreviation	Description
BPM	Business process management
CMM	Capability maturity model
Context DFD	Context data flow diagram
ERD	Entity relationship diagram
FAST	Framework for the application of systems thinking
IE	Industrial engineering
IS	Information system
ISD	Information system design
OCD	Organisation construction diagram
OR	Operations research
SMED	Single minute exchange of die
TPT	Transaction product table
TSP	Traveling salesman problem
VRP	Vehicle routing problem
WBS	Work breakdown structure

1. Introduction and background

In the Project context, the background of the company is introduced with an introduction to where the project was initiated. The Problem/need statement is then given in section 1.2 with its significance discussed in the following section, Project motivation. The relevant areas in industrial engineering are given in the last section of Chapter 1 in Appropriate theoretical context.

1.1 Project context

Established in 1993, Company ABC is a family owned furniture removal company. Since starting with local removals in one pickup truck in 1993, the company has grown to a nationwide 26 vehicle business with more than a hundred employees facilitating in roughly 1400 moves per month.

They specialize in transporting, storing and packaging home and office furniture with storing facilities in Gauteng, Cape Town and Durban. Company ABC's vehicles range from locally used light pickup trucks and trailers to interlink trucks that are used for transport on all major routes between Pretoria, Johannesburg, Cape Town, Pietermaritzburg, Durban, Bloemfontein and Nelspruit.

In recent years, the company has rapidly expanded and therefore problems that were minor previously, are now starting to become more prominent. After receiving complaints on customer service, the company's executive management requested the further development of the company's initial information system. Further projects were initiated by the student.

Customer satisfaction is very important and typically measured in on-time arrivals for collections and deliveries, customer complaints received after moving or storing furniture and customer reviews. The number of enquiries for quotations against the number of accepted quotations are a good indication of the company's competitiveness as it shows how many potential customers end up using Company ABC. Responsiveness regarding quotations is typically measured by measuring the time from when the consultant first receives an enquiry, until the quotation is sent.

1.2 Problem/need statement

With an increase in customers and consultants, planning jobs are becoming more complex and customer satisfaction is sometimes lost in unresponsive and unsatisfactory service.

1.3 Project motivation

Customer service is very important to Company ABC and is measured using several measures. Firstly, customer satisfaction is measured in on-time arrivals for delivery and collection, the number of complaints received per job and the reviews given for the service. The number of accepted quotations in relation to the number of enquiries for quotations received, show how many potential customers end up using Company ABC's services. Consultants' responsiveness to these quotations are measured from the time a consultant receives an enquiry to the time the quotation is sent out. The table below shows a summary of investigations discussed in Chapter 4.

Table 1: Summary of measurements in Chapter 4

Measure	**Formula**	**Result**
Customer complaints	$\frac{Completed\ surveys\ with\ complaints \times 100\%}{Total\ completed\ surveys\ received}$	16%
Quotes accepted	$\frac{Quote\ requests\ received\ during\ period\ \times 100\%}{Quotes\ accepted\ during\ period}$	19%
Average number of quotes per day	$\frac{Total\ number\ of\ quotes\ during\ time\ period}{Total\ number\ of\ days\ in\ time\ period}$	17
Average response time	$\frac{Time\ quote\ sent - \ time\ quote\ request\ received}{Number\ of\ quotes\ sent\ in\ period}$	2 hours and 40 minutes

According to the company's management, these are all measures that need improvement including an increase in customer contact time.

Consultants need sufficient time for interacting with customers to ensure that customers are fully prepared for their move, since many moving teams arrive at customers who are not yet ready for loading. Moving teams do multiple moves per day and deviation from the schedule can cause them to fall behind on their schedule and arrive late for subsequent jobs.

When vehicles are behind schedule, more customers phone the office to enquire on the team's expected arrival time and an already busy operations manager must follow up on the day's progress.

Customers are sometimes unaware of their expected arrival time, because last-day confirmations are started too late and left unfinished. Vehicle scheduling is done manually daily by the operations manager and when the schedule is released late, last-day confirmations with customers cannot take place before the end of the workday.

Although bookings for jobs are done on the initial information system (IS), referred to as the *diary system*, jobs are manually allocated to a certain vehicle. Consultants try their best when allocating a vehicle to a new booking, to do so in the most optimal way. Still, the operations manager sets aside two hours every work day to revise the schedule for the following day.

The operations manager's job description is very broad and he is the only official manager apart from the financial manager. He is therefore a prominent figure for other employees to direct any queries to and is rarely able to finish the scheduling in his designated two hours. If he is then behind schedule, the consultant doing last day confirmations is also late and cannot contact all the customers to confirm arrival time for the next day. This causes wide-spread confusion among customers and unprepared customers can cause more deviations from the schedule. This, in turn, has a snowball effect where customers experience the company as unprofessional and may lead to losing customers for future jobs.

Customer service is also affected by vehicle breakdowns. When a vehicle experiences a breakdown, either the company mechanic is sent or a third-party mechanic is paid to assist.

Communication between the company's consultants and customers happens mostly through e-mails, standard documents and the company's website. Although these forums contain the necessary information, it is often discovered that customers are not aware of all the services the company provides. Customers therefore do not receive the experience they may have desired.

The work done by consultants is mainly paper-based. Bookings are made from e-mail or telephonic interaction with customers and extra notes are made on hard copies. These hardcopies travel between departments and customer notes and details are therefore only visible to whoever has the hardcopies at the time. Although shared spreadsheets are supposed to be updated, as consultants get busier, they neglect to update the information. When customer invoices do not contain all the required information of services to be done, the customers do not receive all the services they have paid for.

To keep up with the rising demand, five employees were hired in only two months. With no training division, already busy employees are expected to thoroughly train newcomers and meet the rising demand.

By observation it was evident that employees follow their own processes. Where employees had their own especially efficient systems in place, their sales volumes corresponded.

The company does not have management hierarchies except for a financial and logistics manager. Consultants' performances are rated monthly by rough estimates based on historical sales data. Their salaries include commission on their sales and therefore they are the only employees in the company to be rewarded for more than satisfactory work. Other employees' work is never formally regulated and in some cases believed to be below standard.

1.4 Appropriate theoretical context

This section provides a brief overview of the appropriate theoretical contexts in IE required to solve the above problem.

1.4.1 Business Process Management

In Chapter 4 the triggers used to identify a BPM project (Jeston & Nelis, 2006) are discussed. These triggers include high growth, change in strategy, a need for sustainable performance, training issues and low customer satisfaction. Within the BPM project, an appropriate strategy must be developed to align business processes. Strategy analysis and development tools are discussed further in section 2.1.4.1.

Within the BPM project, two processes are identified to be semi-automated. Semi-automation for the first process is achieved by designing an extension of the company's initial information system. The second is the creation of an operations research model to semi-automate daily job scheduling of the company's vehicles.

1. Information system design

Although the information system design forms part of the BPM project, the exact details for the project are discussed separately to provide more detail. The appropriateness of information system design (ISD) to the company's problems are highlighted in the PIECES analysis (Whitten & Bentley, 2007) in Chapter 4.

2. Operations research: Optimization

The appropriate model to use for semi-automating vehicle scheduling is also discussed separately to provide more detail. As discussed further in Chapter 4, the model type is a heuristic model, called a vehicle routing problem (VRP).

3. Quick changeover:

Although not a manufacturing company, the company's mornings resemble changeovers. Every morning drivers and packing teams arrive at the depot to start another day. The time from arrival until the time the vehicle leaves the depot is the total changeover time. Considering that most routes around the depot experience heavy morning traffic, leaving the depot as early as possible should be a priority. Single minute exchange of die (SMED) is a quick changeover tool identified to reduce changeover time in the morning.

The theoretical context for the project therefore includes a combination of IE techniques, with four subareas including corporate strategy, ISD, operations research (OR) and SMED.

2. Literature review

In the first section, a literature review is done on the project approach for reducing the company's process inefficiencies. Embedded into BPM is ISD, which is discussed in section 2.2. In section 2.3, literature is discussed for the project approach of an OR problem.

2.1 Literature on BPM and process modelling

The literature studies done for BPM include the literature on a BPM project approach and the process modelling techniques used in BPM.

2.1.1 Enterprise construction

Enterprise ontology describes only the essence of an organisation without its inherent complexity (Perinforma, 2015).

Aspect model theory consists of four axioms: Operation axiom, transaction axiom, composition axiom and distinction axiom (Perinforma, 2015). The operation axiom describes actor roles operating an enterprise by production and coordination acts (Perinforma, 2015). According to the transaction axiom, each ontological transaction consists of a standard pattern with an initiator and executor consenting or dissenting to each other's acts (Perinforma, 2015, p. 18). The relationship between production facts as products of successful transactions are described in the composition axiom (Perinforma, 2015). The distinction axiom entails the three possible human abilities of actor roles. These abilities are known as performa (creating), informa (reasoning) and forma (information processing) relating to ontological, infological and datalogical transactions respectively (Perinforma, 2015, p. 25).

Since a clear understanding of the internal business processes is necessary, modelling using enterprise ontology could significantly reduce the complexity associated to discovering the internal systems in the enterprise. The ontological model is also longstanding, because it does not contain any infological or datalogical transactions or implementation-specific organisational functions. With infological and datalogical transactions, data is used and manipulated. Ontological transactions create data by exposing and evoking commitment. By being general instead of implementation-specific, the model does not change often and stays relevant if the essence of the enterprise does not change.

Modelling method

There exist four ontological aspect models known as the construction model, process model, fact model and action model (Perinforma, 2015). The construction model is the most concise of the models and contains the transactions, actor roles and relationships between the actor roles and transactions (Perinforma, 2015). The process model is the first level of detail of the construction model and depicts the transaction pattern for each ontological transaction, commonly referred to as business process models (Perinforma, 2015). The action model is the collective action rules which serve as guidelines for actor roles in dealing with their agendas (Perinforma, 2015). It is the second level of detail for the steps in the process model of each transaction type in the construction model. The fact (or state) model is also a detail level of the construction model, because it details the coordination and production banks (Perinforma, 2015).

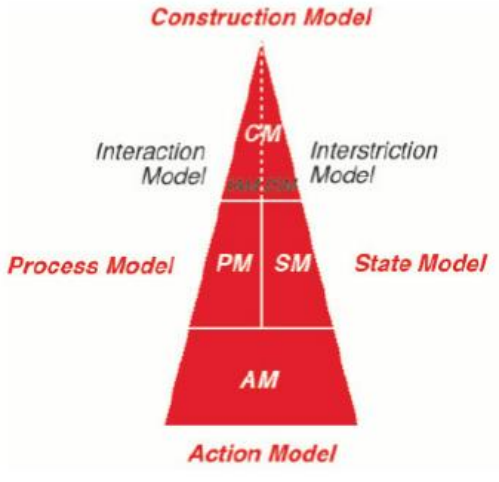


Figure 1: Ontological aspect models (Perinforma, 2015, p. 51)

The OER (Organisational Essence Revelation) method is used to identify the B-organisation production and coordination acts/facts, transaction kinds and the corresponding transaction patterns (Perinforma, 2015, p. 45). The OER methodology and representation of the organisational essence are contained in the DEMO methodology described below.

DEMO methodology: Compiling a *construction model* (Perinforma, 2015)

1. Allocate all pieces of available information into performa, informa and forma sets.
2. Divide performa items into production- and coordination acts/ facts and identify actor roles.
3. Create a Transaction Product Table (TPT) by identifying transaction types and product types for each transaction type.
4. Compile an Organisation Construction Diagram (OCD) by identifying initiating and executing actor roles for each transaction type.
5. Compile the process, fact and action models from the construction model.

Every transaction consists of at least four steps: request, promise, state and accept as stated in the process model (Perinforma, 2015, p. 13). The sequence for each step is shown in the process model, along with the sequence of the transactions. This is a very effective process model, especially since it is also implementation specific. For this project, however, the process models for the business are modelled using business process model notation, or BPMN. BPMN is used, because it is an international standard known by most professionals and intuitive for final users to understand (Chinosi & Trombetta, 2012). BPMN is a used for other purposes, but is the first choice when modelling processes for descriptive reasons (Chinosi & Trombetta, 2012). The four steps of each transaction are used to verify completeness of the BPMN model.

2.1.2 Literature on BPM project approach

Business process management is the managing and controlling of an organisation's fundamental business processes to reach its goals (Jeston & Nelis, 2006).

Although it is challenging to create an approach that is appropriate for all organisations and situations, the BPM implementation framework (Jeston & Nelis, 2006) can be used as guideline for BPM implementation. The phases are listed in Table 2: BPM Implementation framework below:

Table 2: BPM Implementation framework

1. Organisation strategy	Clear strategic goals and visions. Strategy must become culture.
2. Process architecture	Rules, principles, guidelines and/or models for implementation across organisation. Where process, IT and architecture is aligned with strategy.
3. Launch Pad	1. Starting point 2. Agreed goals and visions for process 3. Establishment of project
4. Understand	Understanding the initial business process environment.
5. Innovate	Creation and comparison of different development options.
6. Develop	Building all components required for implementation of new processes.
7. People	Activities, roles and performance measurement is in line with strategy and process goals.
8. Implement	Roll-out of new development.
9. Realise value	Measure value outcomes as outlined in step 3.
10. Sustainable performance	Develop a process structure where continuous improvement is realised.

Because the company is not yet a BPM mature company, the project is classified as a 'Pilot project' (Jeston & Nelis, 2006, p. 62). The business manager is fully informed in the project, but not yet convinced of its significance. Scenarios for process improvement indicate that the impact on the organisation should be to improve or redesign end-to-end processes.

2.1.3 Problem analysis

Although it is dependent on many circumstances, some likely triggers exist for initiating a BPM project (Jeston & Nelis, 2006, p. 16). Only relevant triggers are mentioned in the table below.

Table 3: Drivers and triggers for BPM

Category	**Drivers and triggers**
Organisation	High growth – difficulty coping with high growth.
	Change in strategy – Actively deciding on a direction for strategy.
Management	The need for the introduction of a sustainable performance environment.
	The need to create a culture of high performance.
Employees	Training issues with new employees.
	The expectation of a substantial increase in the number of employees.
Customers	Low satisfaction with service due to staff being unable to give adequate attention within adequate time frame.
Processes	Lack of process standardization
Information technology	Introduction of new IT architecture.

High growth, employee training and low customer satisfaction have been mentioned in section 1.3. Focusses on management and information technology were added due to the lack of clear management teams and an introduction of a new IS as seen in Chapter 1.

2.1.4 Requirements elicitation

Requirements elicitation includes phases one to four of the implementation framework. Each step to these phases are discussed comprehensively for the project approach in section 11.5 Appendix E: Detailed steps in BPM Literature review.

2.1.4.1 Strategy

Strategic intent is how a business achieves its goals (Jeston & Nelis, 2006, p. 67). Following the steps in section 11.5.1.1, it provides:

- Long term direction for competitive advantage
- A competitively unique point of view about the future
- An emotional edge where the employees see the goal as inherently worthwhile

Results of organisational strategy:

- Essential for process architecture
- Project aim must add value in line with strategy
- Results should be considered again during innovate phase

1. PESTEL analysis

PESTEL analysis is a strategy analysis tool used to evaluate external factors influencing organisational strategy (Porter, 2004b). It identifies political, economic, social, technological, environmental and legal factors as significant external factors (Porter, 2004b).

2. Porter's five forces

A company's choice of strategy is defined by the way it positions itself against its competitors with the competitors divided into Porter's five forces (Porter, 2004b):

1. Threat of new entrants
2. Bargaining power of buyers
3. Threat of substitute products or services
4. Bargaining power of suppliers
5. Rivalry among existing competitors

When these forces are of low intensity, the opportunity for superior performance increases (Porter, 2004b).

After assessing its position against these forces, the company can formulate a strategy using one of the following three approaches (Porter, 2004b). The strategy can firstly position the company to best defend against the five forces by analysing strengths and weaknesses and not confronting competition where the company is weak. The company strategy can also be used to change the causes of the forces or anticipate when there are shifts in the forces approaching. Porter's five forces is used to distinguish Company ABC's position relevant to the above mentioned five forces in Chapter 5.

3. Porter's value chain

The value chain of a company includes all activities required by an organisation to satisfy customer needs (Porter, 2004a). The value chain can be used as a tool for strategic planning when analysing cost and differentiation advantages (Porter, 2004a).

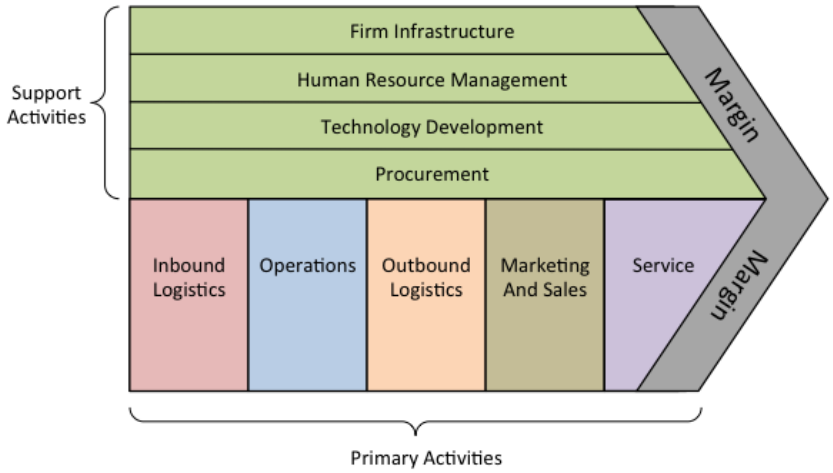


Figure 2: Porter's value chain (Porter, 2004a)

Porter's value chain forms the basis of a manufacturing industry's value-adding activities. This value chain, however, must be adapted to take on a generalised form of a service organisation (Nooteboom, 2007). A value chain developed for the transportation service industry is shown below.

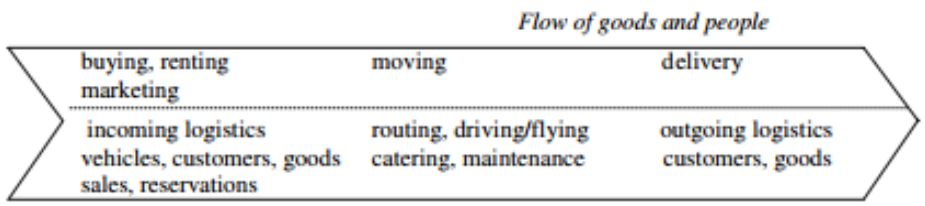


Figure 3: Transportation industry value chain (Nooteboom, 2007)

Value is added in various stages of the value chain. These stages are compared to the generalised form of Porter's value chain for manufacturing organisations (Nooteboom, 2007).

Table 4: Comparison between traditional and service industry value chains

Traditional value chain	**Transport service organisation value chain**
Inbound logistics	Goods sales, reservations, incoming vehicle logistics, incoming customers
Operations	Packing/ transporting/ storing, tracking goods in transit, routing, driving, maintenance
Outbound logistics	Delivery, luggage removal, complaints

Traditional value chain	Transport service organisation value chain
Marketing and sales	Buying, renting and marketing
HR Management	Training, leave management
Procurement	Packing materials, vehicle parts, fuel

4. The balanced scorecard

The balanced scorecard is a tool used to align business processes to high level organisational strategy (Kaplan & Norton, 1996b). The balanced scorecard is seen from four perspectives, namely the customer, financials, internal processes and learning and growth (Kaplan & Norton, 1996b). Goals and measures aligning to the company strategy and vision are developed as seen in Figure 4 below.

Figure 4: Balanced scorecard- Four perspectives (Kaplan & Norton, 1996b)

Cause-and-effect relationships established between these perspectives show how the measures and goals for each of the perspectives are linked (Kaplan & Norton, 1996b).

Strategy, financial and customer objectives are set, where after internal processes are highlighted that are critical to enable these goals (Kaplan & Norton, 1996a). Companies must excel at these processes to be successful (Kaplan & Norton, 1996a).

- Identify long-term goals
- Identify required resources and tools
- Identify financial and nonfinancial short-term measures

Measures are linked between perspectives with cause-and-effect relationships, by estimating the relationship between measures (Kaplan & Norton, 1996a). For example, if the one measure shows a result, how long till the other starts showing a certain result (Kaplan & Norton, 1996a).

a. Financial perspective

To establish financial objectives, an organisation must be identified to be in one of the following three stages: growth, sustain or harvest (Kaplan & Norton, 1996a). Since Company ABC is still in a growing stage, investments should be made to develop products, employees, information systems and infrastructure (Kaplan & Norton, 1996a).

Financial objectives for Company ABC are % growth in revenue, % growth in customers and % target markets and regions.

b. Customer perspective

Before identifying measures form the customer perspective, the specific customer segment to target should be identified. Company ABC has a wide-ranging target market. They typically want to target medium to high income home removals and small to medium office removals. Since it is the company's mission to make your move happen as smoothly as possible, customer satisfaction is a very important measure. Customer loyalty, retention and acquisition also show satisfaction levels of customers and are easily tracked. Customer profitability is the measure of the profit made per customer. Since the company tries to keep their basic removal costs low and competitive, this is a measure of the amount of packaging material and other related services.

c. Internal business process perspective

The internal business process measures are accounted for during the BPMN process design.

Table 5: Typical internal business process measures (Kaplan & Norton, 1996a)

Innovation measures	**Operation measures**	**Post-sale measures**
% sales from new products	Quality	Quality
New product introduction vs competitors/ plans	Time	Time
Time to develop new product	Flexibility	Response time
	Response times	% complaints resolved by single call

d. Learning and growth opportunities perspective

In this perspective, the resources required to reach the goals in the previous perspective, are identified. These three relevant principles are seen below (Kaplan & Norton, 1996a):

1. Employee capabilities
    a. Employees working closest to the internal processes should give ideas for improvement.
    b. Employee satisfaction, retention and productivity are measures relating to employees.
2. Information system capabilities
    a. Must have excellent information.
3. Motivation, empowerment and alignment

These perspectives are used to create strategic measures for internal business processes and employees.

2.1.4.2 Process architecture

Process architecture ensures alignment of processes with strategy, IT systems and other related processes. Further detail into steps taken in this phase can be seen in Appendix E: Detailed steps in BPM Literature review, section 11.5.1.2.

Results for process architecture

- Documented and agreed process architecture
- Project start architecture
- Organisation process view
- List of end-to-end processes

2.1.4.3 Launch-pad

Since this phase forms the base of the project scope, how it is established and how it is started it is a critical step for this project and is therefore discussed explaining the different steps within the phase. This phase is critical as it is the phase where most of the individual project planning is done.

Results for launch pad phase

- Identified processes with metrics and agreed goals
- Initial implementation strategy
- Project management deliverables
- Initial business case

2.1.4.4 Understand

Before processes can be improved, the project team first must have a good understanding of the initial processes and their performance. This understanding is gained in the steps during the Understand phase. These steps are discussed in section 11.5.1.4.

Results/ Outputs from this phase

- Initial process models
- Appropriate metrics to use for baseline comparisons
- Performance levels of initial processes
- Documentation containing suggested improvements
- Identification of possible quick but effective changes

2.1.5 Evaluation of alternatives

The Innovate phase is phase 5 as seen in Table 2: BPM Implementation framework. In this phase, processes are made to be as efficient and effective as possible within the project scope. Alternative designs are developed and then chosen for their prospective benefits. Steps taken during this phase are discussed in more detail in section 11.5.2.

Results of the phase

- Redesigned process models with corresponding documentation and high-level business requirements
- Detailed cost-benefit analysis for comparisons
- Planning for new capacity requirements
- Confirmation that new processes conform to predefined requirements
- Project plan for People and Develop phases

Quick changeovers

SMED is a tool developed at Toyota's factory to reduce changeover time from days to under 10 minutes (Shingō, 1985). Toyota's implementation steps are described in Figure 5 below. As a first step, all activities taking place during a changeover are recorded. Activities are divided into two groups, namely *internal* and *external* activities. *Internal* activities are activities that must take place during the changeover. *External* activities, on the other hand, can possibly be done before the changeover. Once activities are separated, non-value adding activities are removed and the changeover time consist only of internal activities.

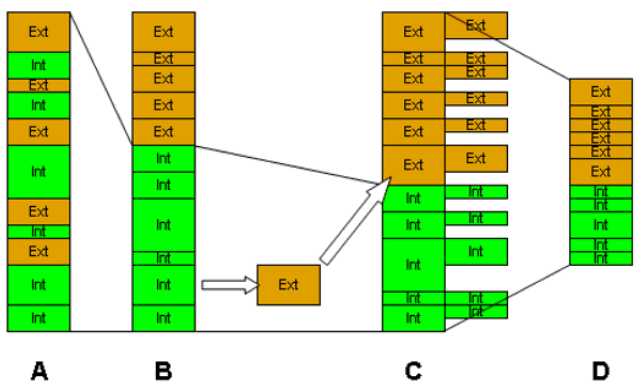


Figure 5: SMED (Shingō, 1985)

2.1.6 Solution Construction

Phase six and seven are discussed as part of the solution construction and are referred to as the people and develop phases.

2.1.6.1 People phase

The objective of the people phase is to ensure that the activities executed by individuals in a process are in line with organisational strategy as decided earlier in the project.

Results of the phase

- New role descriptions as agreed with stakeholders
- Agreed measures for performance for executors of processes
- A new process based organisation structure

2.1.6.2 Develop phase

This phase takes the solution as constructed in the innovate phase to implementation and deployment.

- Elevated overview of the solution
- Comprehensive business requirements
- Finalise software specification and configuration

2.1.7 Implementation

Phase 8 is the Implement phase and is the last part of the project cycle as it is where the plans are implemented for use. During this phase, change management is extremely important as it is where all the planned changes in previous phases take effect.

Results of the phase

- Trained and motivated staff
- Improved processes conforming to expectations and requirements as outlined in business case

2.1.8 Evaluation

The Realise value and Sustainable performance phases, phases nine and ten, are used for evaluating the project.

2.1.8.1 Realise value phase

Performance of the new processes should be compared to the benefits as stated in the business case. This will enable the organisation to see the value added by the project, once the transition phase is concluded.

Results of the phase

- Benefits tracking matrix

The benefits tracking matrix uses input from the deliverables of other phases to identify benefits with their corresponding measures and targets. The actual achievements of these benefits are measured and evaluated against the expected target (Jeston & Nelis, 2006). A summative evaluation is used to evaluate the quality of the evaluand by the end-users (Stake, 2004). A summative evaluation (Stake, 2004) in the form of interviews is used to evaluate conformance to non-functional requirements.

2.1.8.2 Sustainable performance phase

If new processes are unsustainable, process improvements will not have the desired effect and fade out to old habits. The purpose of this phase is to ensure that process improvements become part of business as usual.

- Managed and improved processes
- Mechanisms identifying process improvement opportunities.

2.2 Literature on the project approach for ISD

An approach known as the framework for the application of systems thinking (FAST) (Whitten & Bentley, 2007), is an example of a model-driven development approach for information system design. It requires the drawing of models for problem analysis and visualisation and defining the business and information system requirements. Figure 6, below shows the steps included in the FAST Approach to information system design. These steps are discussed in greater depth in sections 2.2.1 to 2.2.6.

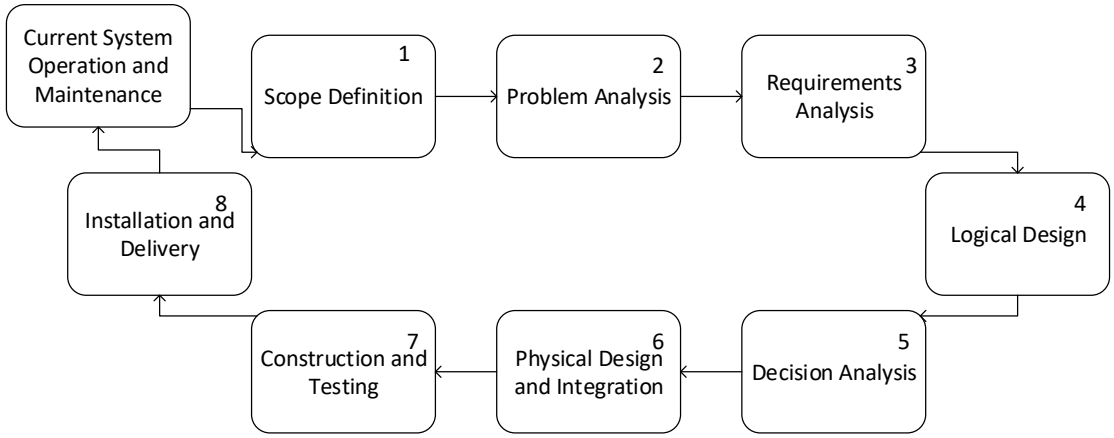


Figure 6: FAST Methodology (Whitten & Bentley, 2007)

2.2.1 Problem analysis

The PIECES approach (Whitten & Bentley, 2007) is used in problem analysis to identify a problem as a possible information systems design problem. PIECES is an acronym for performance, information, economic, control, efficiency and service. The initial situation is measured against each of these six measures and from there it is determined whether the problem is related to information system problems. A PIECES analysis is done in Chapter 4 as it was necessary to first confirm whether the problems experienced are related to information system design, after management initiated an information system design project.

Since the company already used a specially developed information system, the objective was to expand the initial system using the developer of the existing information system.

The essence of enterprise operation (Dietz, 2006) is studied in the problem analysis with the key deliverable the organisation construction model. Jan Dietz recommends creating construction models to assist in requirement analysis.

The seven fact-finding techniques (Whitten & Bentley, 2007), used in requirements discovery are stated with their relevance to the project:

Table 6: Data-gathering techniques (Whitten & Bentley, 2007)

Fact-finding technique	**Relevance to project**
1. Sampling existing documentation, forms, etc.	Documents initially used will have to be replaced.
2. Research and site visits	Used for observation and interviews.
3. Observation of work environment	Potential users observed in initial process.
4. Questionnaires	Customer service rating through questionnaires.
5. Interviews	Interviews with potential users and management.
6. Prototyping	Prototyping done by external developer.
7. Joint requirements planning (JRP)	Video call meeting with all stakeholders as developer is abroad.

2.2.2 Requirements elicitation

The objective of requirements analysis is to determine what the information system should be able to do. A typical deliverable used is the business requirement statement.

The data gathered using above techniques are used to identify the functional and non-functional requirements of the system.

1. Functional requirements

To understand the requirements and specifications for a software (object) system, the construction of the organisation (using) system as seen in Figure 7 below must first be understood (Perinforma, 2015, p. 99). The construction model as developed and discussed in section 2.1, is used to derive the use-case diagram mentioned in the table below.

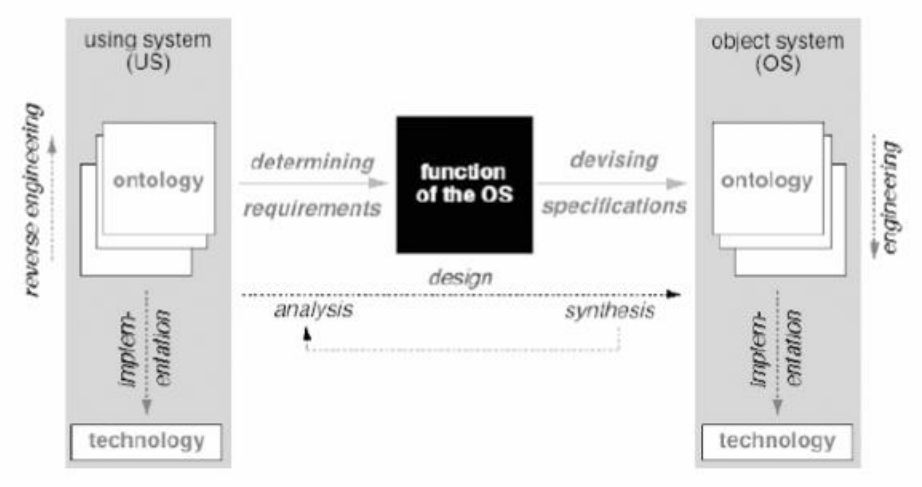


Figure 7: System development process (Dietz, 2006)

Functional requirements include process requirements, data requirements and interface requirements and represent what the system should be able to do (Whitten & Bentley, 2007).

Table 7: Functional requirements (Whitten & Bentley, 2007)

Functional requirement	Description	Deliverable
Process requirements	Indicating process flow requirements.	Use-case diagram
Data requirements	Indicating data relationship requirements.	Data model
Interface requirements	Indicating interfaces with systems/ users.	Context data flow diagram

2. Non-functional requirements

These requirements depict what the system should be to perform satisfactory. Typical features that are also applicable for this ISD project are security, performance, reliability (Whitten & Bentley, 2007).

2.2.3 Evaluation of alternatives

Decision analysis of different alternatives are tested using different feasibility objectives. If testing different alternatives, the suitability of each alternative is compared against certain criteria (Whitten & Bentley, 2007). Typical objectives include:

Table 8: Feasibility objectives for Decision Analysis

Technical Feasibility	Are there employees with the technical expertise to design or develop the proposed information system?
Operational Feasibility	Is the proposed system in line with requirements stated by users?
Economic Feasibility	Does the system make economic sense for the company?
Schedule Feasibility	Is the time required for design and implementation acceptable?
Risk Feasibility	Is there a significant probability that the implementation will be successful?

The deliverable for this phase is a selected option and system architecture for the best alternative. Since this project is only to develop an expansion of the initial information system, referred to as the diary system, other options for alternatives to a solution have been eliminated. This project does therefore not include a feasibility analysis amongst alternatives. It is however a beneficial to verify that the proposed solution still adheres to the above feasibility criteria.

2.2.4 Solution construction

The conceptual or logical design depicts the business requirements and is illustrated in the system models. In the relevant project context, the construction is done by an external developer. The deliverable for this phase is the responsibility of the software developer and it is the working system models.

2.2.5 Implementation

The implementation model is the user requirements translated into a system model that represent a technical implementation of user's business requirements. Typical deliverables are redesigned business processes, design prototypes, physical design models, specifications and final documentation (Whitten & Bentley, 2007).

Redesigned business processes and final documentation including training manuals are the necessary deliverables for this phase and are the responsibility of the student. The redesigned business process is important since there was no standard procedure before commencement of the ISD project. Training manuals are developed to support user capabilities on the system.

2.2.6 Evaluation

The system is reviewed to compare outcomes with expected outcomes. The revision is done to ensure that the system adheres to all specified functional and non-functional requirements (Whitten & Bentley, 2007). In the case it does not conform, the non-conformities are identified and re-engineered to conform to the specified requirements. A summative evaluation (Stake, 2004) is used to evaluate the outcomes of the information system where the quantitative results of the phase are shown in the benefits tracking matrix as discussed in section 2.1.8.

2.3 Literature on project approach for Job scheduling

The approach to be followed is the seven steps for building a model for operations research (Winston, Venkataramanan, & Goldberg, 2003, pp. 5-6). This methodology is appropriate, since the model to be developed should be a prescriptive model using OR techniques. The seven steps are:

1. Formulate the problem
2. Observe the system
3. Formulate a mathematical model of the problem
4. Verify the model by using it for prediction
5. Select a suitable alternative
6. Present the conclusion and results to the organisation
7. Implement and evaluate recommendations

2.3.1 Problem analysis

During step one, the problem is formulated and the aim stipulated. In this project, the aim is to create a model that will help to schedule vehicles for jobs that minimise fuel costs to the company.

2.3.2 Requirements elicitation

For requirements elicitation, the system is observed to establish initial working of the system and its needs if a model is created for support. It would include considering the number of vehicles it can take, its ease for workers to work with, the speed of its calculation and its interface with the company's information system.

2.3.3 Evaluation of alternatives

During this phase, the type of Operations research model is investigated to determine the type of model to be used. The Traveling Salesman Problem (TSP) is a well-known optimisation problem where the salesman wants to find the shortest distance between multiple cities that he each must visit once. Because of its complexity, this problem is mostly solved using ejection chain heuristics, rather than finding one optimal solution (Gutin & Punnen, 2006).

This problem was taken a step further with the vehicle routing problem (VRP) that entails scheduling the routes of multiple vehicles from one depot to multiple geologically dispersed customers (Coelho et al., 2016). Of these problems, there are numerous versions catering for diverse distribution needs. The *heterogeneous fleet multi-trip vehicle routing problem* (HFMVRP) is a descendant of the popular VRP (Coelho et al., 2016) and a variant of this problem is used.

The variant of the HFMVRP is used for its special qualities (Coelho et al., 2016), namely:

1. Heterogeneous fleets.
2. Multiple trips
3. Docking constraints

4. Fixed and variable transportation cost per vehicle.

Heterogeneous fleets firstly refer to the fact that there are vehicles of varied sizes and specifications (Coelho et al., 2016). This is appropriate for the VRP experienced by Company ABC, since its vehicles vary from pickup trucks with trailers to big interlink trucks. Multi-trips indicate that one vehicle can make multiple trips in a day. The docking constraints are also very important, since the customers sometimes specify vehicle restrictions. For instance, when doing a collection at an estate or a block of flats, the vehicles may be restricted by weight or by height. Therefore, the company must either send a smaller vehicle with the truck, or send a smaller vehicle to be a shuttle between the house and the truck. Fixed and varied transportation costs are appropriate, since the vehicles do not have the same fuel economies, but have fixed costs depending on the moving teams and drivers of the vehicle.

The heuristic algorithm used to solve this problem is the GILS-VND with its three different procedures (Coelho et al., 2016). These procedures are the *iterated local search* (ILS), *Greedy randomised adaptive procedure* (GRAP) and the *variable neighbourhood descent* (VND).

Since the above VRP variant does not conform to all the necessary specifications for the company's VRP, more variants are investigated.

Table 9: VRP's investigated

VRP type	Characteristics
Multi-depot VRP (Shimizu, Sakaguchi, & Yoo, 2016)	• heterogeneous fleet of vehicles • pickup/delivery time windows • varying pickup/delivery locations • multiple objectives
HVRPMBTW (heterogeneous fleet, mixed backhauls, and time windows) (Belmecheri, Prins, Yalaoui, & Amodeo, 2013)	Mixed backhauls also imply that vehicles can perform pickups or deliveries.
HVRPMBTW (heterogeneous fleet, mixed backhauls, and time windows) (Dechampai, Tanwanichkul, Sethanan, & Pitakaso, 2017)	As implied by name, with time windows indicating when a customer must be serviced.
Split deliveries (Belfiore & Yoshizaki, 2013)	Can split deliveries between multiple vehicles.

2.3.4 Solution construction

Steps three and four are followed during solution construction. In step three a model is described using appropriate principles as established in its requirements analysis. The model is verified in step four to ensure that it is an accurate representation of the system.

In step five, the operations researcher chooses the best alternative for the stated objectives and presents the results to the organisation for approval.

2.3.5 Implementation and evaluation

Implementation of a solution is based on the outcome of the solution selection with an appropriate conclusion and recommendation. If the results presented are approved, the model is implemented and evaluation of the model takes place continually to ensure its successful operation.

2.4 Summary

Below follows a summary of the findings of the above literature studies.

2.4.1 BPM

It is evident from Table 3: Drivers and triggers for BPM that the problems experienced by the organisation are common triggers for a BPM project. As the organisation does not have any prior reference to process models, the organisation construction model is firstly compiled to establish the essence of the organisation. Before process models are developed for the organisation, its strategic goals are recognised to create a balanced scorecard. The balanced scorecard as discussed in section 2.1.4.1, is used to align processes to the organisational strategy. From here, implementation specific process models are constructed using BPMN. For implementation of BPM, the phases and steps as listed in section 2.1 are followed diligently from the Problem analysis to Evaluation phase.

2.4.2 ISD

The FAST approach, as discussed above was chosen because it is a model-driven approach. This approach is especially fitting to the problem context as the project was initiated as a development of an expansion on an already existing and tailor-made information system.

The student performs Problem analysis and Requirements elicitation for the software developer as described in section 2.2. Evaluation of alternatives are discussed as different options from the software developer and thus evaluation of alternatives and solution construction may deviate from the FAST methodology as it is done to the software developer's own accord. The implementation and evaluation phases are done according to the FAST methodology.

2.4.3 Job scheduling

The methodology used in developing an OR model (Winston et al., 2003) with all subsequent steps are used in the development of a vehicle scheduling and routing model for the company.

Different variants of the common VRP's are investigated and it is found that literature initially does not cover a VRP with constraints as needed by the company. The characteristics are discussed in Table 9 above and their limitations are discussed in Table 28 in Chapter 6 below.

3. Project approach

Although the main project approach is of BPM, ISD and VRP are smaller projects within the main project. Since ISD and VRP projects are of independent knowledge areas, they can also have their own project approaches within the main BPM project approach. The BPM project approach is described in section 3.1, with reference to the approaches followed for the subprojects in sections 3.2 and 3.3.

3.1 Project Approach BPM

The project approach describes the methodology (Jeston & Nelis, 2006) to be used as described in Chapter 2. In the understand phase the DEMO methodology is followed to do the enterprise construction to model the essence of the organisation first. Once the construction model is created to provide an overview of the organisation, BPMN is used to construct process models.

3.1.1 Phases, activities

Table 10: Phases and activities for a BPM project approach

Generic solution design phases	**Project solution design phases, activities, techniques and software tools**	**Reference to chapter where techniques are applied**
Problem analysis	Evaluation of triggers stated in Chapter 2 Time study	Chapter 4 4. Problem analysis
Requirements elicitation	Development of strategy Process architecture ○ Enterprise construction, Model World Online ○ Requirements for ISD and job scheduling projects, MS Visio 2013 Launch pad phase ○ Initial processes identified, documented using BPMN and Bizagi Modeler Understand phase ○ Innovate opportunities	Chapter 5 5. Requirements elicitation Section 5.2.1 Enterprise construction Section 5.2.2.1 Quotation system Section 5.2.2.2 VRP model Section 5.3.2 End-to-end process model and Appendix H: Initial process models

Generic solution design phases	**Project solution design phases, activities, techniques and software tools**	**Reference to chapter where techniques are applied**
		Section 5.4 Understand phase
Evaluation of alternatives	Innovate phase ○ Development of BPM solutions using Bizagi modeler. Expected performance evaluated with cost-benefit analysis. ○ Feasibility analysis for ISD ○ Feasibility analysis for VRP alternatives.	Chapter 6 Solution Selection Section 6.1 Process model selection Section 6.1.2.1 ISD Cost vs. benefit Section 6.1.4 VRP Alternative evaluation
Solution construction	People phase: ○ Ensure activities are in line with strategy Develop phases: ○ Takes design from Innovate phase to deployment, solution overview	Chapter 7 Solution constructs Section 7.1 Scripts, role descriptions and SMED Section 11.9 Appendix I New process models Section 0 Overview of overall solution
Implementation	Implement phase ○ Implementation approach ○ Identified risks	Chapter 8 Section 8.1 Implementation approach Section 8.2 Implementation phase risks
Evaluation	Realise value phase ○ Compare actual benefits with expected benefits using a benefit tracking matrix and summative evaluation Sustainable performance ○ Ensures feasibility for long term use.	Chapter 9 Section 9.1.1 Evaluation of implemented solutions Section 9.1.2 Evaluation of non-implemented solutions Section 9.2 Sustainable performance phase

Specific steps within phases mentioned in the above table will be followed as stipulated in Appendix E: Detailed steps in BPM Literature review.

3.1.2 Main deliverables

All interim deliverables are completed as described in the relevant phases and discussed in Chapter 2. The deliverables for BPJ models are used for project evaluation. Deliverables for project execution are created by the student to use in the initial BPM project, but also for the organisation to keep and update when continuing with BPM when the project is completed.

Table 11: Key BPM deliverables

Deliverables for BPJ 410 and 420
1. Project topic 2. Project Proposal 3. Preliminary project report (also reflection on learning) 4. Ethical clearance as in Appendix B: Ethics approval 5. Oral presentation 6. Interim project report 7. Final project report 8. Poster 9. Oral presentation

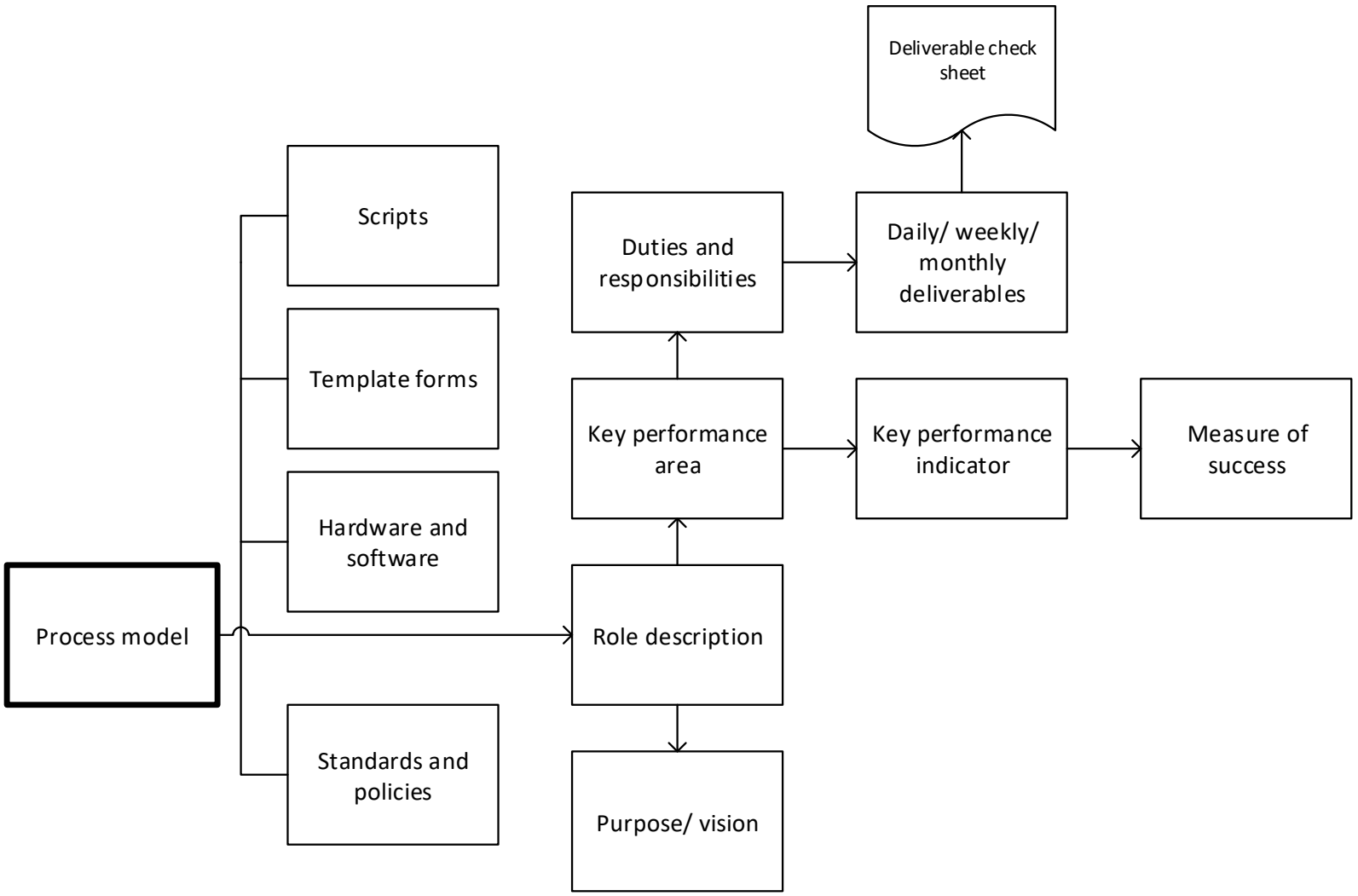


Figure 8: BPM deliverables

Process model communication scripts are developed to be used in certain instances of customer interaction, for example when speaking to a first-time customer to get details. Template forms that are integrated with hardware and software used, are developed and/or specified. Standards and policies considered during the process model development are detailed and the dashboard is the definition of metrics used in the key performance indicators to measure outcome in line with standard.

The role description includes the company's purpose and vision in line with the work the role forms part of. Responsibilities of the role include certain compulsory periodic deliverables. Separately key performance indicators measure levels of success as defined in the dashboard.

3.2 Project approach ISD

Although this part of the project is not treated in isolation of the BPM project, it is highlighted in this section for more detail.

3.2.1 Phases, activities

As stated in the literature review, the FAST methodology is used for modelling the system for the software developer to expand an already existing information system.

Table 12: Project approach

Generic solution design phases	**Project solution design phases, activities, techniques and software tools**	**Reference to chapter where techniques are applied**
Problem analysis	PIECES Analysis Enterprise construction: Modelled using Model World online	Chapter 4 Section 4.6 PIECES framework Section 5.2.1 Enterprise construction
Requirements elicitation	Process requirements: Use-case diagram using MS Visio Data requirements: Data Model, Modelled by developer of IS. Interface requirements: Context DFD using MS Visio	Chapter 5 Section 5.2.2 Quotation system
Evaluation of alternatives	Software developer of existing information system is used to expand the initial system.	Chapter 6 Section 6.1.2.1 Feasibility and cost-benefit analysis
Solution construction	Done by software developer Training manuals	Chapter 7 Section 7.1.2 Training manual
Implementation	Redesigned business processes using Bizagi modeler	Chapter 8 Section 11.9 New process models

Generic solution design phases	**Project solution design phases, activities, techniques and software tools**	**Reference to chapter where techniques are applied**
Evaluation	Evaluation Summative evaluation from interviews Benefits tracking matrix for quantifiable evaluation	Chapter 9 Section 9.1 Summative evaluation from interviews Section 9.1.1 Measured evaluation

3.2.2 Main deliverables

Table 13: Deliverables for ISD

Main deliverables for project execution
1. PIECES analysis 2. Requirements: Use-case diagram, Entity relationship diagram (ERD), Context DFD 3. Implemented improved information system 4. Training manuals 5. Evaluation Process model and enterprise construction included in deliverables for BPM project.

Deliverables one and two for project execution will mainly be used by the student to construct the needs of the organisation for the software developer and deliverable four will be developed for end-users of the new IS.

3.3 Project approach job scheduling

The VRP part of the project is not treated in isolation of the BPM project, but highlighted in this section for more detail. The project approach describes the methodology to be used as described in Chapter 2.

3.3.1 Phases, activities

Table 14: Phases and activities for OR project

Generic solution design phases	**Project solution design phases, activities, techniques and software tools**	**Reference to chapter where techniques are applied**
Problem analysis	Enquiry for system needs and formulation of project aim	Chapter 4 Problem investigation Section 4.6.3
Requirements elicitation	Observation of initial system for functional and non-functional requirements. Establish appropriate constraints and objective.	Chapter 5 Conceptual design Section 5.2.2.2 VRP model
Evaluation of alternatives	Further research on appropriate OR models and selection of appropriate type.	Chapter 6 Section 6.1.4 Cost-benefit analysis
Evaluation/ Recommendation	A recommendation is made on the development of a VRP.	Chapter 9 Section 9.1.2.2 Recommendation

Above activities were based on section 2.3 Literature on project approach for Job scheduling and described in more detail in the literature review.

3.3.2 Main deliverables

1. System needs and project aim
2. Functional and non-functional requirements
3. Chosen model type
4. Recommendation on VRP

4. Problem analysis

A problem analysis is done on the BPM related problems in Chapter 4 and an analysis for job scheduling problems is included in section 4.6.3. The BPM problem analysis is done using the Table 3: Drivers and triggers for BPM in the Literature review .

4.1 Organisation

From Table 3: Drivers and triggers for BPM , two organisational reasons call for a BPM evaluation. The first is sudden or unsustainable growth.

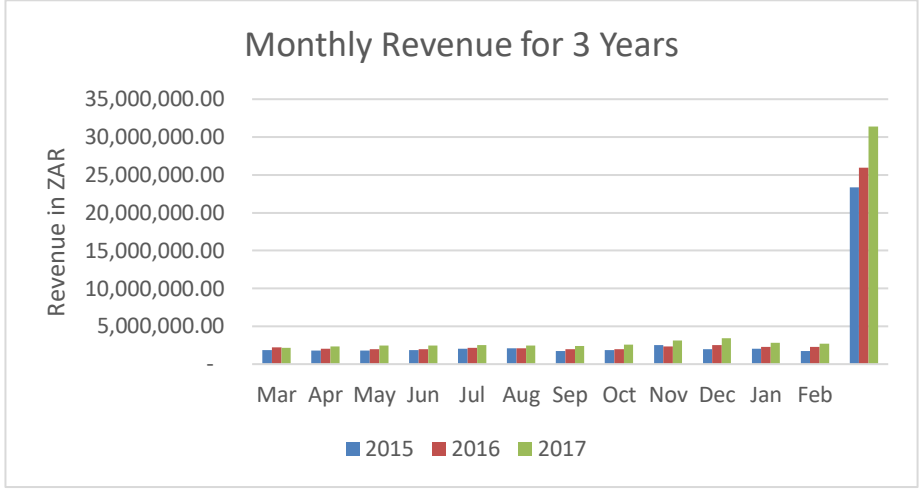


Figure 9: Monthly revenue over 3 years

Equation 1: Revenue growth (Equation 1)

$$\frac{(2016\ Revenue - 2015\ Revenue)}{2015\ Revenue} = 0.21$$

From the above figure it is clear to see that Company ABC has been growing every year when comparing revenues for each month. Equation 1 calculates that the company has grown in revenue with a 21% increase from 2015 to 2016.

The second reason to consider BPM is when the company undergoes a change in strategy. Company ABC has not considered a change in strategy, but does not have a clear strategy at all. Although the company's inherent strategy is sure to be imbedded into its operations already, it is necessary to find exactly what they are. This is done to align all its processes with the strategy, making processes contribute directly to the company's strategic goals.

4.2 Employees

Because of the growth in its revenues, Company ABC has been acquiring employees and trucks to accommodate for its demand. This has realised in five employees being hired in three months. With two of the five being office personnel, these employees need training on the initial

systems as well as dealing with customers. Company ABC has no training department and therefore the already busy employees need to train them.

In an interview with one of the experienced consultants, the interviewee said that the maximum number of quotations done per consultant per day should not be more than thirteen. According to the employee, this is to give enough attention to customers and potential customers. Initially, consultants do an average of 17 quotes on a busy day and simply cannot give customers the attention they need. This results in poor service, customers being unprepared for their moves and losses in potential sales.

4.3 Management

The need for a sustainable performance environment calls for a potential BPM shift. There are few managerial hierarchies in the organisation. Employees do not report to direct managers and performance measurements are not always clear.

Autonomy on the employee's behalf is encouraged, but should happen within certain limits. Performance measures should be used to demonstrate to employees what is expected of them.

4.4 Customers

The topic of customer satisfaction was already referred to during section 4.2 under employees. Customer service is measured against on time deliveries and collections, response time to quotations and customer complaints. Response time once again relates to the time study discussed in section 4.6.1, under *performance* in the PIECES framework.

On time collections and deliveries are not always adhered to and causes the whole day's schedule to be late. This, in turn, causes widespread confusion among subsequent customers. In a recent survey done with customers, there were 16% of customers complaining about poor customer service.

4.5 Processes

After careful observation of office personnel, it was clear that each employee had their own methods and processes. Little to no standardisation was present in their work which could impact sales performance significantly. Where consultants were absent, colleagues could not help them out, since they did not know everyone's individual processes and annotations.

4.6 Information technology

Considering the ISD part of the project, a new process should be developed for it before it is automated or used in an IS. This calls for BPM on related processes before commencement of the ISD.

Although a specifically tailored and developed information system, referred to as the diary system, is used for bookings and scheduling, little information is stored on it for the long run. Customer quotations are handled with interaction between the company's interactive website and e-mails. Request for quotations are received from the customer in the form of a furniture inventory list containing all contact details and the relevant requested services. These lists are manually captured into a spreadsheet quotation and sent to the customer. The company initially has

very limited statistics about the number of quote requests received, in relation to the number of quotations accepted. This happens, as the consultants are required to manually update their progress of each job on a spreadsheet.

The spreadsheet used to update on a customer's progress, as discussed in the Project motivation, is not maintained well. Consultants barely get essential admin done in their busy schedules and often neglect what they feel is less vital.

When analyzing the initial quotation system against the Capability Maturity Model (CMM) (Whitten & Bentley, 2007), the initial system is hardly level 2 – Repeatable. This project involves the creation of standard business processes and new employee job descriptions with specific KPIs. Level 3 is therefore reached with a *defined* methodology and level 4, is reached where *measurable goals* are set for productivity. The aim for any business should be to create a level 5 – *optimizing system*, where the process is not only defined and managed, but repeatedly improved using measures and data analysis. The aim of this project is to create a level 4 organisation, where productivity is measured using defined KPIs.

Expanding the information system to the quotation process will promote quality and documentation consistency, which the system initially lacks. Consultants will be able to shorten response times for customer quotations and improve customer service with relevant information stored centrally on an integrated system. The process will have no paper trail and save money on printing costs.

Observation showed that about 40% of time spent on quotations were due to copying information to and from e-mails, quotations, inventory lists and spread sheets. When taking 20 minutes per quote, it means that they could be spending 8 minutes copying data.

4.6.1 PIECES framework

The PIECES framework (Whitten & Bentley, 2007) is used as analyses for identifying problems and opportunities relating to information systems. The PIECES framework was applied to Company ABC's initial quotation process.

Performance

During January and February, the company received 79 and 69 quotation requests respectively per day. While this may seem fair for 8 consultants, quotations are not equally distributed since consultants are assigned to certain moves based on the size and location of the move.

Of 2,808 enquiries done in January and February, only 530 quotes were accepted. This means that only 19% of enquiries for quotes were accepted by customers within the same month. Although some customers request quotes long before their requested service date, the low acceptance rate indicates that there is more demand for their services than they are providing.

Consultants could possibly be losing customers because of deficient performance relating to responsiveness to enquiries for quotation. A time study, attached as Appendix F: Quotation time study, was done to investigate the possibility. The time study was done over a period of a month with different consultants and different days of the week. This would make a significant difference as the company tends to have busier times during month-end.

The average time for quotation response time is 2 hours and 40 minutes, with a maximum of a customer waiting 11 business hours for a quote. Since there are many released in under an hour, the company could strive to do all their quotations within an hour after receiving it.

Information and Data Improvement

Reception and consultants initially use two parallel systems: a paper based system and an electronic spreadsheet containing summaries of work progress. Employees communicate using Skype and Outlook e-mails and update Google sheets with the latest information pertaining to their specific jobs. Because updates on the spreadsheets happen separately from the paper based system of completing the work, consultants often neglect updating the spreadsheet information to update their progress.

Request da	Moving da	Client name	Size - CUB	Price		Sta	Fr	To
2017/01/20	TBA		1326		6100		WC	EC
2017/01/20	2016-01-23		85		3500		Cpt	Dbn
2017/01/20	27-30 Jan		587		3900		Cpt	Cpt
2017/01/20	2016-02-06		2321		5900		Cpt	Cpt
2017/01/20	Feb 2017		901		8900		cpt	kzn
2017/01/20	Feb 2017 Part		1870		11200		cpt	pta

Figure 10: Screenshot of consultant spread sheet

In the above figure, the consultant had not yet updated the status of her assigned clients to “quoted” or “accepted” two months after being assigned to the clients.

Consultant’s notes pertaining to unique information on job details are often only handwritten on the hard copies of documents and not copied to the “comments” column on the spreadsheet. When the hard copy goes to the logistics teams, the reception no longer has any proof or knowledge of the notes.

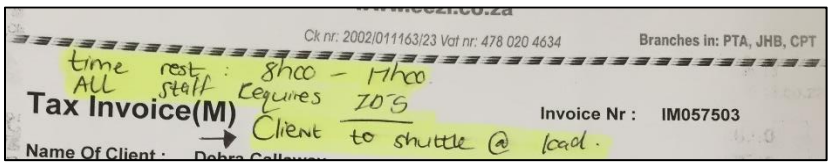


Figure 11: Hand-written notes on customer quotations

Saving customer details in the form of e-mails, inventory lists and quotations are the consultants’ own responsibilities. When a customer is recurring, the consultant will only notice by chance if the customer is assigned to the same consultant. Information is therefore not stored centrally, but on the hard drives of the office computers.

Economic improvement

Economic improvement could be direct or indirect. Printing cost is a direct cost for using a paper base process. Using hard copies cost the company R25,000.00 for print work during February 2017 alone.

Indirect costs due to the inefficiencies of the initial system are harder to trace as they consist mostly of lost opportunity costs for quotations not accepted. In a competitive environment, customers demand quick response times and therefore lose interest if response times are too long. In an environment where products are goods instead of services, there are four possibilities for a customer's reaction when there is a stock out (Coyle, 2017):

1. The customer waits until the product is available.
2. The customer back orders the product.
3. The seller loses a sale.
4. The seller loses a customer.

In the case where the product is in the form of a service, the customer cannot really backorder and many times the sale and/or the customer is lost.

Control and security improvement

Incoming quote requests are assigned to consultants by reception who prints the document and puts it into the appropriate consultant's shelf. As consultants receive commission on accepted quotes, it is important to have control and visibility over which consultant receives the quotation request.

Figure 12: Shelves where quotations are assigned to consultants

Figure 13 shows where the consultant updates his/her own spreadsheet. Management has little to no control over information in these spreadsheets and to a degree depend on consults' honest and meticulous administration. Consultants receive commission based on successful sales as captured in these sheets and payments received.

Reference	Request date	Moving date	Client name	Size - CUBES	Price	Price per cube	Status	From	To	Telephone number
M00752	2017/01/20	23-31 January		553	1596		Accepted	PTA	PTA	082 870 7712
M00753	2017/01/20	2017/01/28		842	2223		Accepted	JHb	PTA	083 279 2165
M00754	2017/01/20	31 Jan 17		519	1650	3.179190751	Quoted	JHB	JHB	078 015 2318
M00755	2017/01/20	29 Jan 17		2083	4160	1.997119539	Accepted	PTA	PTA	082 874 0164

Figure 13: Screenshot of Consultant Specific Spreadsheet

As stated in the information and data improvement section, data is not stored centrally, but on the hard drives of the consultants' computers.

Efficiency of people and processes

Consultants and reception spend a lot of their time copying data from e-mails, requests and quotations. The lack of integration in their systems results in copying information at every step in the process. Information is copied from quotation requests to quotations, quotations to bookings, bookings to invoices, all e-mails and appropriate spreadsheet fields in between steps.

Observation showed that about 40% of time spent on quotations were due to copying information to and from e-mails, quotations, inventory lists and spread sheets. When taking 20 minutes per quote, it means that they could be spending 8 minutes copying data.

Service improvement for customers

Customer service improvement goes hand in hand with previously mentioned performance and economic improvement. Once consultants can do quotations quicker, the will have more time to tend to more quotations or customer interaction in the form of pre-or post-sale support.

4.6.2 Website problems

In addition to its booking system, Company ABC has a fully interactive website. Customers login to the website and provide their contact details and sometimes even their job requirements themselves. These lists are then automatically printed at the office, where reception manually records the details on another form to calculate the volumes. From here the forms are sent to the consultants.

As seen from reception, roughly 70% of customer enquiries are received through the website. This means that to a lot of their customers, Company ABC's website is their first encounter. If they have an unpleasant experience with the website, their first impression of the company is also poor. Customer service is therefore greatly influenced by the effectiveness of the website.

Company ABC management can track the number of people going to their website and filling in their forms. Daily, it sometimes happens that roughly fifty people start filling in a form and never complete it. When a form is left unfinished, a potential customer is missed. With a conservative average of R 1,000.00 per job, it could lead to a R1,000,000.00 loss in monthly income.

Two steps were identified to be especially confusing and drawn out. These steps pertained to the customer's choice of Company ABC's packing services and self-packing as seen below.

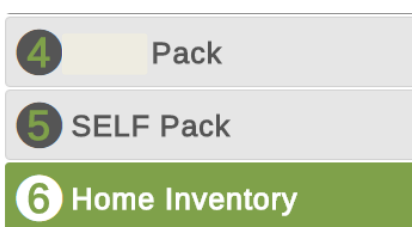


Figure 14: Steps on website

In the home inventory step, the customers list their inventory items separately. As customers must do the inventory step, they often omit going into the other steps and never realise that Company ABC provides packing services as well.

4.6.3 Job scheduleling

The operations manager has set aside two designated hours per day to do the scheduling of the 26 vehicles for the following day's jobs.

Since the company does not have many hierarchies in management levels, the operations manager is one of the few employees with an elevated title. This means that many of the other employees go to him for advice on their own work. It then happens that he does not always finish the scheduling in time for the last-day confirmations.

Because Company ABC sometimes accepts jobs until the day before the move, no confirmations as to when the vehicles will arrive are done with customers until the last day. Once the operations manager is done with the schedule, the last-day confirmations consultant calls each customer to inform them about their expected arrival time.

If last-day confirmations are not done by the end of the day, customers get upset and are sometimes unprepared when moving teams arrive. This may upset the whole day's schedule with moving teams already scheduled to work from 7AM to 7PM.

Vehicles are used based on their packing space in cubic feet, in relation to the customer's belongings, also measured in cubic feet. It is very important to take careful note of the volumes, since customers pay largely per cubic foot and since the same truck is scheduled to visit more than one destination during a working day.

The objective is to use as little fuel as possible. The depots are mostly used for storage areas and therefore are mostly situated outside of the cities, where large properties are available and less expensive. This automatically means bigger fuel costs for every vehicle used.

Trips can run either locally (within a region) or long-distance (across provinces). Local trips may be collected and temporarily stored at a depot (called pre-collections) or directly collected and delivered. Pre-collections happen mostly while customers wait for a long-distance truck to make a trip to one of the other depots. In such a case, the trip is called a pre-delivery. Long-distance trucks can however, still collect and deliver directly without visiting depots.

To solve this scheduling problem is already complex and becomes more complicated with an increase in vehicles and jobs and to meet demand. Company ABC acquired two new trucks in only the last two months and therefore the possibility of more complexity is imminent.

5. Requirements elicitation

In this chapter, the functional and non-functional requirements for the project are given. The requirements for a BPM project are included in the first four steps of the BPM project approach as described in Chapter 2. Included in the Process architecture phase are the functional requirements for the ISD and VRP model.

5.1 Strategy phase

As mentioned in Chapter 4, Company ABC does not have an established strategy or vision. The strategy phase as discussed in Chapter 2 is used to establish an appropriate company strategy for Company ABC.

5.1.1 Analyse internal and external aspects of the organisation

The steps outlined in Figure 31: Organisation strategy (Jeston & Nelis, 2006, p. 69) in Chapter 11 are followed to construct organisation strategy. External strategic factors are discussed using the PESTEL analysis and Porter's five forces and internal strategic factors are discussed in terms of value disciplines. A conclusion summarises the findings of the strategic analysis.

1. PESTEL analysis

The PESTEL analysis (Porter, 2004b) is used to evaluate external factors affecting organisational strategy.

Table 15: Company ABC PESTEL analysis

	Opportunities	**Threats**
Political	Relatively free trade High emigration rates and thus moves	Building storage facilities – politically unstable Workers – labour unions
Economic	Little wage/ price controls	Recession- moving people have limited capital Credit not easily available Poor infrastructure for certain roads. Inflated cost for densely populated areas – remote depots Increasing fuel prices
Social	Growing workforce – diverse workforce available	Wealth not equally distributed Increasing criminal activities on certain routes Long working hours

	Opportunities	**Threats**
Technological	New systems Tracking devices	Tools (storage)
Environmental	Could contribute to company image to engage in environmentally friendly activities and campaigns.	Greenhouse gases Weather influences (rain)
Legal	Accounting regulations	Accountability Safety compliance requirements

PESTEL analysis on Company ABC shows several threats, especially due to an unstable political environment which is leading to an unstable economic environment. The small number of high paying customers are already segmented between various companies in the market, with some companies relying on their age for advertising. Although the company has many external threats, there are also great opportunities to grow the business. The industry is fairly unregulated and there are no industry giants, therefore the company can use opportunities to grow and compete. The company has a technological advantage, because they use a modern tailor-made information system, helping them to reach operational efficiencies. Since transport services, especially vehicle exhausts, are big contributors to CO and CO_2 emissions, it would be advantageous for Company ABC's public image to do their part in conserving the environment. Poor infrastructure, increasing criminal activity and increasing fuel prices directly impact the routes taken by Company ABC. It is therefore important to decide on the target market area and to do proper vehicle scheduling. Since the country is initially in a recession, many people are moving and cannot afford expensive removal services. This is a threat to gain high-income customers, but also an opportunity to provide lower income households with removal services. Although the company is struggling to acquire employees at the required rate, the country is experiencing rising unemployment rates. Workers vary from unskilled to highly skilled and therefore the company has a growing pool of potential employees to choose from.

2. Porter's five forces

The aim of using the five forces model is to position the company strategically in such a way that the 5 forces provide advantageous circumstances for growth (Porter, 2004b).

Table 16: Porter's five forces on Company ABC

Force	**Description**
Threat of new entrants	Easy entry for small companies. No industry giants. High capital requirements needed to buy infrastructure – warehouse (additional) and trucks.

Force	Description
	Located in Gauteng, Kwazulu-Natal and Western Cape – distributed in SA.
Bargaining power of buyers	Competitors are sending out more site-visits. Customers ask for many quotes – aware of prices. Customers highly regard good service for this personalised service.
Threat of substitute products or services	Wrapping/ packing products may be substituted. Furniture removal- no likely substitute.
Bargaining power of suppliers	Low, since the raw material used for the industry is mostly packaging material, which is of low cost and easy to change. Fuel- prices relatively standard
Rivalry among existing competitors	Intense rivalry among competitors. Not a zero-sum competition – compete on price, service differentiation, etc. High possibility for growth in the market.

Since the business is fairly unregulated and there are no industry giants, threat of entry for new entrants is a possibility. It is however a capital-intensive business, where buying or renting vehicles and storage facilities require high capital investment. The bigger rivals all have a country-wide reach, with some also offering international moving services. Although competition is intense, it is not a zero-sum competition and competitors are able to focus on different customer segments. Some competitors, for instance, are more expensive but claim to provide better service than some of the less expensive companies. Customers have high bargaining power, since there are many competitors and can therefore receive many quotes. Customers highly regard customer satisfaction in this personalised industry. Since this is a service industry, little material is needed to deliver the service and therefore suppliers exist of packing material suppliers and fuel suppliers. Bargaining power of both products are relatively low, where packing materials are inexpensive and fuel prices are fairly standard.

3. Value disciplines

Value disciplines (Treacy & Wiersema, 1996) are used to classify the company's inherent strategy within three categories, namely:

1. Operations excellence
2. Customer intimacy
3. Product innovation

Management, as well as the student, classified the company firstly as a company striving for operational excellence. Management is always looking for ways to cut costs to be able to provide competitive prices. To some extent, operations are revised to run smoothly and give great output with minimum input. The company has been advertising for the position of an industrial engineer to assist in this task, but has been unsuccessful in finding an appropriate candidate and has therefore been neglecting improvement tasks.

Although the company inherently focusses on operational excellence, top management has recently realised the value of customer intimacy. Inclusion of customer intimacy into the company's strategy will enhance customer experience.

4. Conclusion

The mission and vision are selected, considering the PESTEL analysis, Porter's five forces and value disciplines identified by management.

Mission: Provide easy and stress-free moves to all our customers.

Vision: To provide easy and stress-free removal services to cater for all moves, big or small.

5.1.2 Impact on processes

To provide easy and stress-free moves, the company must focus on operational excellence and customer satisfaction. Both focus points greatly impact company processes. Operations excellence means that the company is satisfying customer needs by working toward specific key performance metrics. These metrics must be included into the business process model standard to ensure its successful execution. These metrics specifically pertain to saving time and money and the exclusion of any process inefficiencies.

Customer intimacy also impacts the process model, since employees need to interact with customers more. New processes should include specific requirements for closer customer interaction and employees need standard documentation, instructions and scripts to use when interacting with customers.

Porter's value chain

As discussed in Chapter 2, a transport organisation has a different value chain compared to Porter's traditional value chain. Specifically influenced company processes are identified using the value chain approach for transport service organisations. These processes are influenced most by the change in strategy.

Table 17: Influence on Porter's value chain

Traditional value chain	Transport service organisation value chain	Company ABC processes influenced
Inbound logistics	Goods sales, reservations, incoming vehicle logistics, incoming customers	Enquiry to quotation Quotation to booking Confirmations Into-storage collections

Traditional value chain	Transport service organisation value chain	Company ABC processes influenced
Operations	Packing/ transporting/ storing, tracking goods in transit, routing, driving, maintenance	Service day operations Vehicle tracking Storing, packing and transportation services Service and maintenance
Outbound logistics	Delivery, luggage removal, complaints	Out-of-storage deliveries Complaints management
Marketing and sales	Buying, renting and marketing	Marketing for target market
HR Management	Training, leave management	Training
Procurement	Packing materials, vehicle parts, fuel	Procurement of packing materials, fuel and vehicle parts

5.1.3 Strategic measurements

The balanced scorecard as described in Chapter 2, is used to develop strategic measures for each of the four perspectives. These measures influence the internal business process designs, as well as the role descriptions for employees executing company processes.

Balanced scorecard

Company ABC's strategy is presented in Figure 15 below with its corresponding balanced scorecard seen in Table 18.

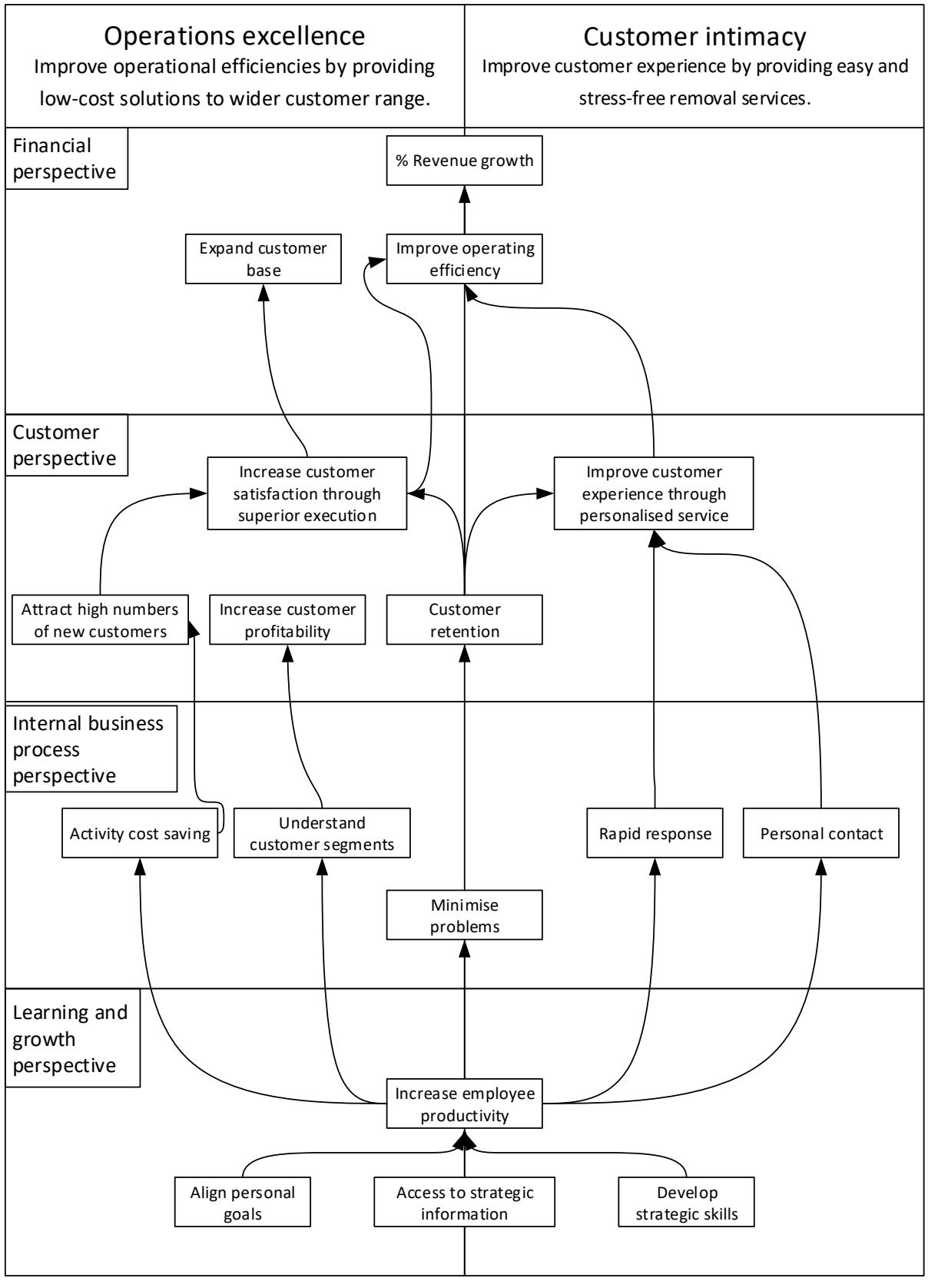


Figure 15: Company ABC strategy

The balanced scorecard is set up to identify key performance areas relating to the four perspectives as seen below.

Table 18: Company ABC balanced scorecard

Strategic objectives	**Strategic measurements**	
	Core outcomes	**Performance drivers**
Financial 1. Revenue growth 2. Operational efficiency 3. Expand customer base	Revenue growth Decrease in operating cost Increase in market mix	% revenue growth Decrease in operational costs Low cost services
Customer 1. Increased customer satisfaction through superior execution 2. Improve customer experience through personalised service	Attraction of high number new customers Increased customer profitability Customer retention High customer satisfaction	Depth of relationship Satisfaction survey Additional service sales
Internal 1. Activity cost saving 2. Understand customer segments 3. Rapid response 4. Personal contact 5. Minimise operational problems	Reduced price relative to competitors Improved service realisation rate Improved service detail accuracy	Costs/ time saved per activity Response time Hours contact with customer
Learning and growth 1. Align personal goals 2. Access to strategic information 3. Develop strategic skills	Employee contribution to overall strategy Access to strategic information through IS Satisfactory technical/ soft skills for superior execution	Personal goals alignment (%) Training on processes and IS

5.2 Process architecture

In the strategy phase, the company's relevant strategies are established. Strategy and business information as well as process guidelines and models are started in this phase. Since this phase is a high level business model, enterprise construction (Dietz, 2006) is used as described in Chapter 2.

5.2.1 Enterprise construction

The first step for modelling the essence of an enterprise is identifying ontological transactions and creating the TPT from with transaction kinds and product kinds (Dietz, 2006). Highlighted transaction kinds marked for semi-automation.

Table 19 lists the elementary and ontological transaction kinds of Companyabc-Move. The column labelled *Product kind*, illustrates the unique result of each *transaction kind.* Words written in **bold** in the *product kind* column represent variables that in combination create a unique instance, with an example of an instance given in the last column.

Table 19: Transaction product table

Transaction kind	**Product kind**	**Example of an instance of a product kind**
T01: Assign consultant	**Consultant** assigned to **customer** by **receptionist**.	Receptionist (Sune Theron) assigned customer (Paul du Toit) to consultant (Sylvia Smith).
T02: Customer quotation management	**Job quotation** completed.	Job (#M00752) quotation (#001) completed.
T03: Periodic local vehicle scheduling	**Local job** scheduled on **vehicle** with **time slot** by local logistics manager.	Local job (#M00752) scheduled for vehicle (TRY 512 GP) with time slot (8:00-11:00) by local logistics manager.
T04: Periodic long-distance vehicle scheduling	Long-distance **job** scheduled on **vehicle** with **date** for **job** slot by long-distance logistics manager.	Long-distance job (#M00752) scheduled on vehicle (BOZ 552 GP) for date (1/01/2017) by long-distance logistics manager.
T05: Long-distance fuel replenishment planning	Long-distance fuel replenishment planned for **vehicle** at **depot**.	Long-distance fuel replenishment planned for vehicle (BOZ 552 GP) at depot (Andy's fuel depot).

Transaction kind	**Product kind**	**Example of an instance of a product kind**
T06: Progress notification management	Progress notification managed after **job** for **vehicle**.	Progress notification managed after job (#M00752) for vehicle (BOZ 552 GP).
T07: Customer payment	**Payment** made by **customer** for **job**.	Payment (#001) made by customer (Paul du Toit) for job (#M00752).
T08: Moving team readiness evaluation	Daily evaluation of **moving team** for scheduled **job**.	Daily evaluation of moving team (Albert, Lukas, Piet) for scheduled job (#M00752).
T09: Basic vehicle readiness evaluation	Daily evaluation of **vehicle** readiness.	Daily confirmation of vehicle (TRY 512 GP) readiness.
T10: Periodic vehicle stock preparation	**Vehicle** stock preparation for **job**.	Vehicle (TRY 512 GP) stock preparation for job (#M00752).
T11: Packing materials level evaluation	Evaluation for replenishment of **packing materials**.	Evaluation for replenishment of packing materials (linen boxes).
T12: Packing materials replenishment	**Packing materials** replenishment by **vendor**.	Packing materials (linen boxes) replenished by vendor (BoxesSA).
T13: Packing material vendor payment	**Payment** made to **vendor** for **package materials** received.	Payment (#422) made to vendor (BoxesSA) for packing materials (linen boxes) received.
T14: Fuel tank level evaluation	Daily fuel **tank** level evaluation.	Daily fuel tank (#1) level evaluation.
T15: Fuel tank replenishment	Fuel replenished of **tank** by **vendor**.	Fuel replenished for tank (#1) by vendor (FuelSA).

Transaction kind	**Product kind**	**Example of an instance of a product kind**
T16: Fuel vendor payment	**Payment** for fuel received by **vendor**.	Payment (#422) for fuel received by vendor (FuelSA).
T17: Vehicle part level evaluation	Evaluation of **vehicle part** level.	Evaluation of vehicle part (clutch) level.
T18: Vehicle part replenishment	Replenishment of **vehicle part** by **vendor**.	Replenishment of vehicle part (clutch) by vendor (TrucksSA).
T19: Vehicle part payment	**Payment** for **vehicle part** replenishment to **vendor.**	Payment (#422) for vehicle part (clutch) replenishment to vendor (TrucksSA).
T20: Periodic vehicle maintenance	Annual maintenance of **vehicle**.	Vehicle (TRY 512 GP) annual maintenance.
T21: Container maintenance	Wooden **containers** maintained for storage **job.**	Crate (#81) maintained for storage job (#M00752).
T22: Warehouse management	**Locations** of storage **job** managed by warehouse manager.	Location (warehouse A, R1) of storage job (#M00752) managed by warehouse manager.
T23: Periodic consultant sales evaluation	Monthly sales evaluated for **consultant**.	Monthly sales evaluated for consultant (Sylvia Smith).
T24: Customer complaint management	**Complaint** managed for **job**.	Complaint (#1) managed for job (#M00752).

Highlighted transactions marked for semi-automation as requested by management.

Highlighted transactions marked for semi-automation as initiated by student.

Highlighted transactions marked for semi-automation as requested by employees.

OCD

After creating the TPT, the OCD is created to depict the initiators and executors of each ontological transaction.

The OCD for Company ABC is in Figure 16: OCD as given below.

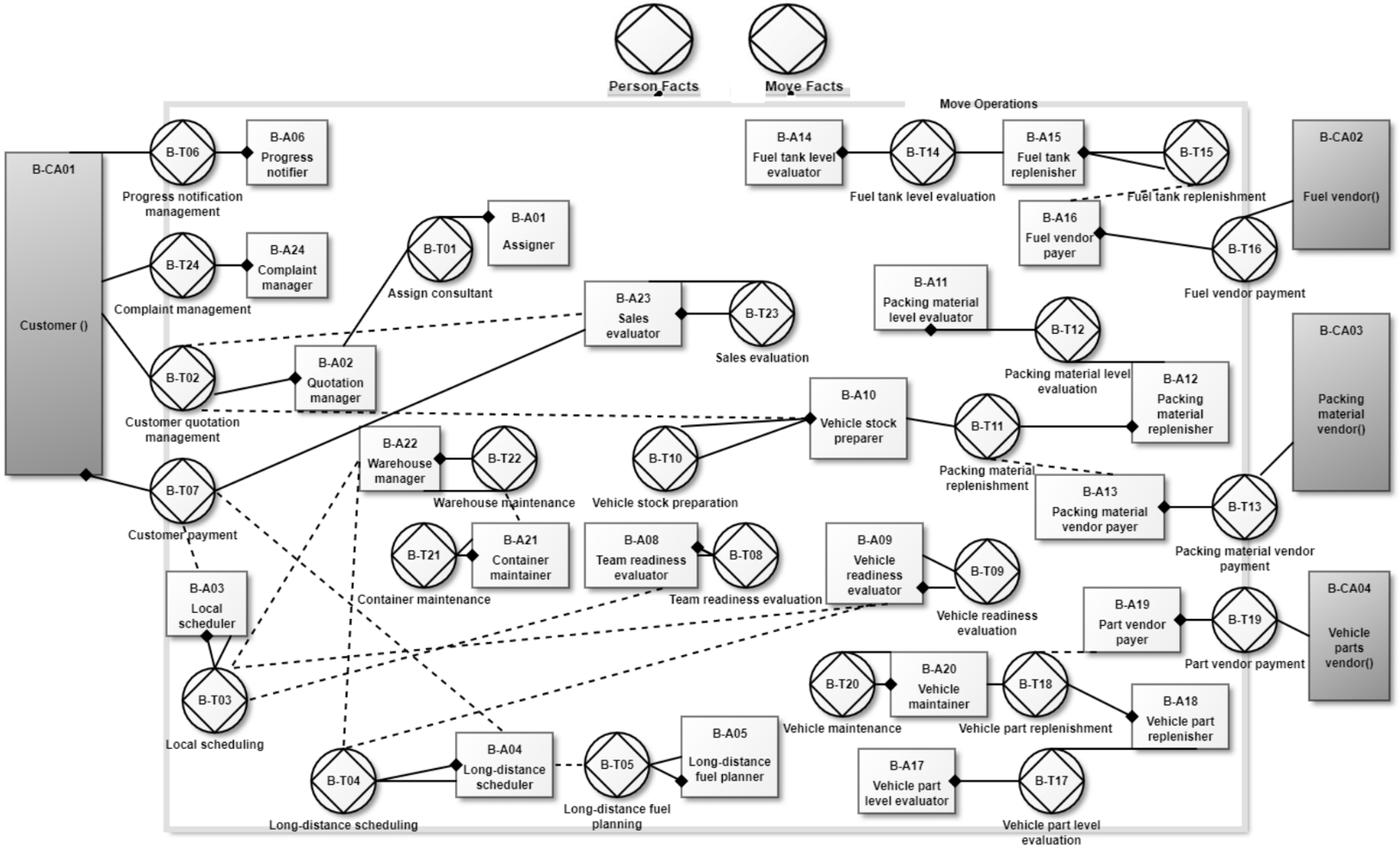


Figure 16: OCD

5.2.2 Relevant IT principles and models

The company initially uses a specially developed transportation logistics system for their bookings. As described in Table 19 above, some of the company's transactions are already semi-automated by this system referred to as the diary system.

Also indicated in Table 19 are transactions identified for semi-automating. These transactions include the transactions for the quotation process and planning done for vehicle routing.

5.2.2.1 Quotation system

As seen in the PIECES framework in Chapter 4, many of the problems on customer service are IS related problems. Strong directive was given from company management to extend the initial IS. The extension must include all transactions relating to the enquiry to booking process, as indicated in Table 19.

As mentioned in Chapter 2, ISD requires functional requirements in the form of process requirements, data requirements and interface requirements (Whitten & Bentley, 2007). These requirements are modelled in a use-case diagram, ERD and a context-flow diagram respectively.

a. Functional requirements

The use-case diagram below is based on the highlighted transaction types marked for semi-automation in Table 19. The diagram along with below narratives are used to describe process requirements to the system developer.

i. Use-case diagram

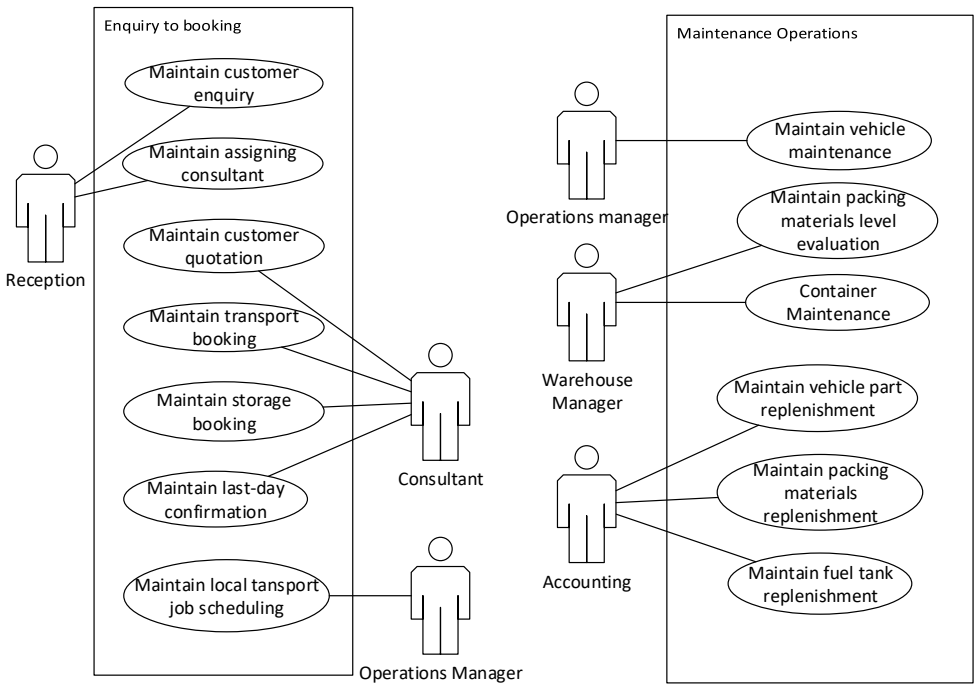


Figure 17: Use-case diagram

Use-case narratives are more detailed descriptions for each use-case. Use-case narratives below are only developed for use-cases that are not already included in the initial diary system.

Transaction types identified by employees are already included in the initial diary system and only need some extra functionality.

Use-case Name	**Maintain Customer Enquiry**
Primary business actor	Reception
Other participating actors	None
Other interested stakeholders	Consultant
Description	Enquiry received from customer via website, info@companyabc e-mail address or phone call. Reception/Automatic reply sends appropriate form via info@companyabc e-mail address to customer.
After	None
Before	Maintain assigning consultant
Date and Version	20/02/2017 V1

Use-case name	Maintain assigning consultant
Primary business actor	Reception
Other participating actors	Consultant
Other interested stakeholders	Finance
Description	Completed form received via info@companyabc e-mail address. Reception manually checks before importing into system. Form information updates system information to either create a new customer or to create a new job for existing customer. System automatically runs query for location fields in form to determine appropriate consultant. Reception confirms consultant and system allocates job to consultant.
After	Maintain customer enquiry
Before	Maintain customer quotation
Date and Version	20/02/2017 V1

Use-case name	Maintain customer quotation
Primary business actor	Consultant
Other participating actors	Finance
Other Interested Stakeholders	Reception, Operations
Description	System notifies consultant of new job. on system. Completed form information is imported into quotation. System generates quotation reference number. If quotation is

	revised, reference number updates accordingly, showing revision number. Price calculator gives guideline prices, but consultant has full control to change it. Also, review customer history for pricing guidelines. When quotation is complete, consultant confirms. Quotation is sent to customer via consultant e-mail address. Job status shows “quoted”.
After	Maintain assigning consultant
Before	Maintain transport booking, maintain storage booking
Date and Version	20/02/2017 V1

Use-case name	Maintain transport booking
Primary business actor	Consultant
Other participating actors	Operations
Other interested stakeholders	Reception
Description	Receive signed and accepted quotation from customer. “Upload” onto system and update system with extra customer details, e.g. restrictions, etc. Job status is updated to “accepted”. Review diary and tentatively book appropriate transport. Job status updated to “booked”. Note: No hard copies yet. Only printed by operations for truck drivers with job containing all necessary information.
After	Maintain customer quotation
Before	Maintain local transport job scheduling
Date and Version	20/02/2017 V1

Use-case name	Maintain storage booking
Primary business actor	Consultant
Other participating actors	Storage
Other interested stakeholders	Reception, Operations
Description	Receive signed and accepted quotation from customer. “Upload” onto system and update system with extra customer details, e.g. restrictions, etc. Review storage diary and tentatively book storage. Note: No hard copies yet. Only printed by operations for truck drivers with job containing all necessary information.
After	Maintain customer quotation
Before	Maintain local transport job scheduling
Date and Version	20/02/2017 V1

Use-case name	Maintain local transport job scheduling

Primary business actor	Operations manager
Other participating actors	Consultants, Storage
Other interested stakeholders	Reception
Description	One day before the booking, the operations manager reviews consultants' tentative bookings and confirms schedule. Printouts are made of quotations on system and invoices on Pastel, for use of truck drivers.
After	Maintain transport booking, maintain storage booking
Before	N/A
Date and version	20/02/2017 V1

ii. ERD

Two data models described Company ABC's information systems, with the first the ERD of the website. This website is used for customers to submit an electronic request for quotation. The second ERD is a depiction of the relationships between entities on the diary system. The diary system is used to schedule jobs. Since the extension of the diary system must directly interface with the website, these two platforms are integrated.

The quotation system imports the details from the website, therefore most of the entities used in the website are also used in the new quotation system. The complete ERD is included in the appendices as Figure 41 in Appendix G: ERD and shows the ERD of the combined system.

iii. Context DFD

The context flow diagram is used to indicate the proposed system's interface with other systems and users.

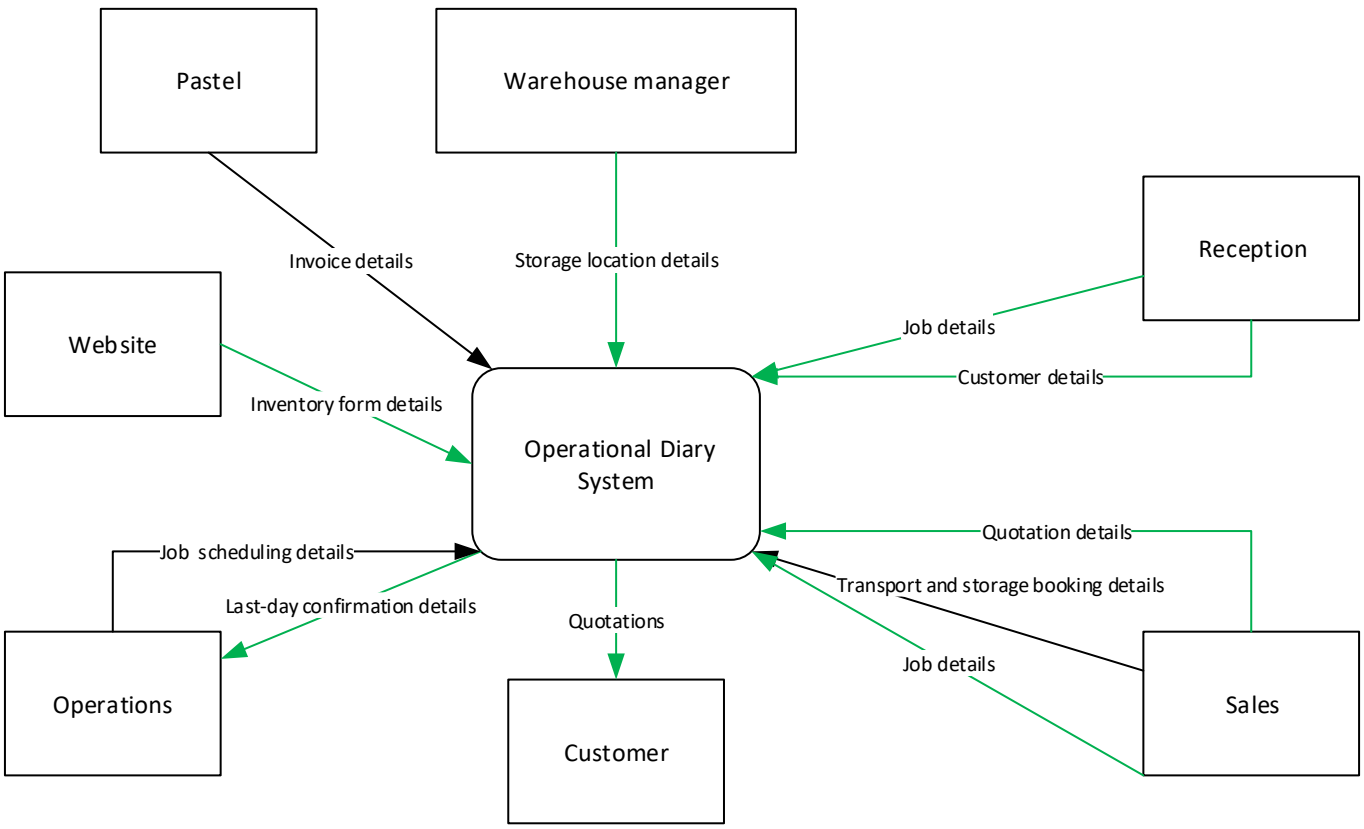


Figure 18: Context DFD

Green inflows and outflows indicate the scope of the extension of the ISD project. The black arrows show the data inflows and outflows of the initial diary system, without the proposed extension.

b. Non-functional requirements

Non-functional requirements are important qualities that the IS must have with typical requirements mentioned in Chapter 2. Additional requirements are derived from criteria discussed in the PIECES analysis. The extension of the initial IS must therefore be:

Table 20: IS non-functional requirements

Requirement	Reason
Compatible with initial system and website	A lot of the data required in the quotation system is already captured in either the website or diary system.
User friendly	The system is supposed to simplify and especially shorten the users' enquiry to booking process.
Secure	Not all the information on the system is relevant to all employees. User restriction should be enforced.
Reliable	The system should be reliable, so data is consistent and trustworthy.
Available	Users must be able to access the same information from different branches and on site visits.
Capacity	The system must be able to store all the required and relevant data for the desired period.
Maintainable	The information on the system should be maintainable by employees. The system should be technically maintainable by a developer.

5.2.2.2 VRP model

A vehicle routing problem must adhere to the following constraints to satisfy Company ABC's VRP:

1. Heterogeneous fleets

The company has a continuously growing fleet of varied size vehicles. The size of the truck is defined by the capacity in cubic feet.

2. One vehicle must be able to do multiple collections or deliveries in one trip.

The vehicles must be able to do multiple collections or deliveries in one trip, because of fixed costs associated to vehicles.

3. Docking constraints

This is especially appropriate when considering collections or deliveries from and to security estates or complexes with vehicle height or weight restrictions. Company ABC can only send vehicles that are not restricted by the customer's constraints.

4. Must be able to send more than one vehicle to a client.

When there are strict vehicle restrictions, Company ABC must be able to send an additional smaller vehicle to work as a shuttle between the address and the bigger vehicle.

5. Fixed and variable transportation cost per vehicle.

These fixed costs include variable fuel economy of different vehicles as well as the driver for the vehicle. There are fixed costs associated to different vehicles, since drivers of bigger trucks need better qualification.

6. Must be able to travel between multiple depots.

Since Company ABC has three depots in different provinces, the vehicles may have to transport customers between depots and pick up or collect loads form addresses between these depots.

7. The total demand of the customers cannot exceed the capacity of the truck assigned to the customers.
8. Vehicles must be able to do mixed backhauls.

Vehicles can be used for collections and deliveries between different customers or depots.

9. Vehicles can be used for service delivery.

Some vehicles may not be used for collection or delivery, but for service delivery, like pre-packing a load before the transportation vehicle arrives.

10. Collections/ deliveries do not have to start or end at a depot

Local transportation is mostly needed between different customer addresses. A company depot will only be included on the route if the local customer requires storage facilities.

Company ABC consultants calculate their quotations based on the volume of the cargo to be collected or delivered. The cargo volume is thus specified before the collections. Experience has however taught consultants to overestimate the cargo by certain percentages depending on cargo sizes, since many customers tend to have a greater volume than they initially expected.

The objective function of the model is to minimise the associated fixed and variable costs to the vehicles.

Below requirements are developed according to non-functional requirements criteria for the extension of the information system.

Table 21: Non-functional requirements for VRP

Non-functional requirement	Reason
Compatible with data exported from IS	The data for the following day should be easily exported from the IS and imported into the Python model.
User friendly	The model is supposed to simplify and especially shorten the user's vehicle scheduling activity.
Reliable	The model should be reliable, so data is consistent and trustworthy.
Capacity	The model must be able to facilitate an increasing number of vehicles and customers.
Maintainable	The model should be maintainable by employees. The system should be technically maintainable when changes are due.
Available	The model and software should be available to use and update, should it be required.

5.3 Launch pad phase

The launch pad phase is the base of the project plan and is used later to evaluate the success of the project.

5.3.1 Implementation plan

The implementation plan as seen below shows the main steps for implementing the BPM project.

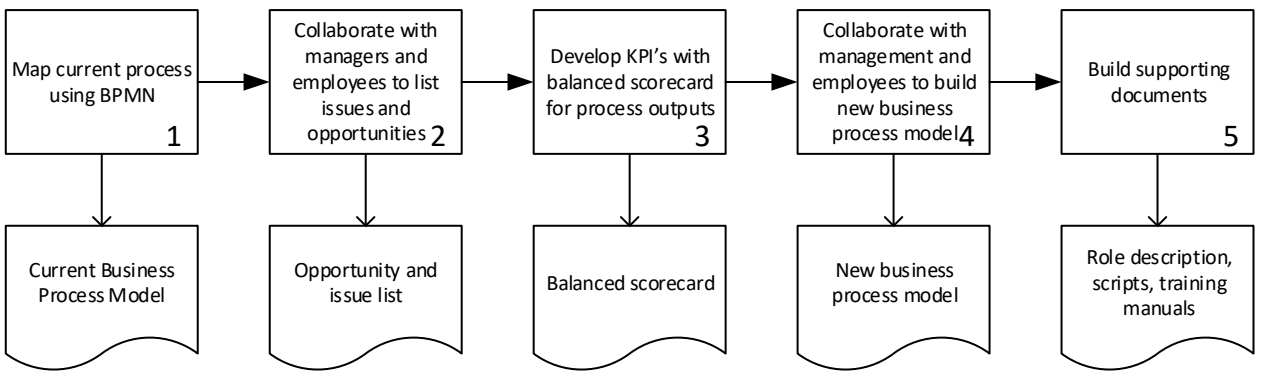


Figure 19: Implementation plan

5.3.2 End-to-end process model

The company's initial process model is mapped using Bizagi modeler and BPMN and evaluated according to the ontological transaction patterns. The BPMN process models are in Appendix H: Initial process models. These models include: enquiry to booking, booking to local service, booking to long-distance move, and replenishment.

A standard transaction consists of four standard steps: A request, a promise for the request, a statement and acceptance of the statement (Perinforma, 2015).

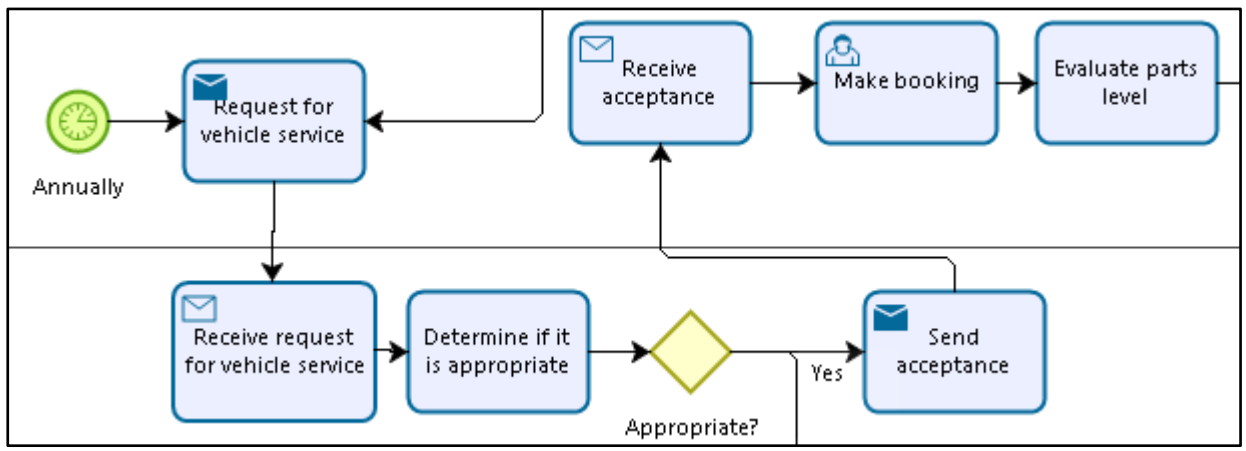


Figure 20: Extract of service process

The servicing process is used as an example for verification of the standard transaction pattern. In the first task, the mechanic requests the logistics manager to book a service. The logistics manager then promises to use his authority to decide and then states that he accepts the request by giving the mechanic authority to book a service. The mechanic then goes ahead and accepts by making the service booking.

Deviations in the pattern can occur when for example a request is denied. Subsequent steps are then followed to ensure that all necessary steps are present.

Walkthrough of end-to-end process model

Since the model is large and consists of many parts, it is divided into parts. A narrative following the BPMN extracts in Appendix H: Initial process models, is given below each extract of the process.

5.3.3 Success checklist

A success checklist is set-up to measure the success of the project after implementation. These checks are the required improvements stated in this chapter.

5.4 Understand phase

During the understand phase, the scope is re-evaluated and facts are gathered to really understand the interaction between people and processes.

5.4.1 Capability analysis and available information

The capability analysis is done to specify the skills required for the "to be" process. Available information is additional information required to assist in completing the process.

Table 22: Process capability

Process	Capability	Available information
Enquiry to quotation	Computer literacy, communication	Scripts when talking to customers, IS training manuals
Quotation to booking	Computer literacy, pricing, communication	Scripts when talking to customers, price lists, sales targets, IS training manuals
Booking to service	Knowledge on job scheduling, communication, computer literacy	Customers booked, payments received, vehicles and workers available, materials available
Replenishment	Making payments, computer literacy	Predetermined replenishment levels, inventory levels, vendor pricelists
Storage	Computer literacy, planning	Available capacity, inventory levels, pre-determined locations
Complaints management	Communication	Job details

5.4.2 Identify innovate priorities

The initial process model was developed by observing employees going about their daily tasks. Since the company does not have any predetermined standards, the initial process model is a generic process model and even sometimes deviated from.

1. There is a clear directive from the company's side to create an extension of their IS for the quotation system.
2. Consultants need to interact more with clients to ensure that they are ready for their move.
3. Consultants must check before booking, to see if local customers have paid at least their deposit and long-distance customers the full price before making a booking.
4. Consultants may never tell a customer that they are fully booked, before giving a quote and enquiring about another date.
5. Consultants must limit their number of revised quotations.

6. Consultants must make sure that customers are aware of vehicle restrictions.
7. Vehicle check-ups, especially truck tyres, must be checked every day before leaving the premises.
8. Stock levels for packing materials and parts must be recorded.
9. The logistics manager does not have time to finish the job scheduling before last-day confirmations.
10. Expected arrival time should be communicated more frequently with customers.
11. Competitiveness must be increased with an increase of the fraction of accepted to distributed quotations.
12. The company's price per cubic foot should be low and competitive in comparison with its competition.
13. The response time per quotation should be lowered to below a one-hour target.
14. The telephonic interaction time with customers should increase significantly.
15. Vehicles should leave earlier to avoid morning traffic on the way to their first customers.

5.4.3 Identify quick wins

1. The website inventory form has a field specifically for restrictions. This field can be updated to show when a customer did not open it.
2. Customers can be notified of Company ABC's packing services while completing the inventory form on the website.

5.5 BPM non-functional requirements

Although some of the non-functional requirements have been mentioned in the above sections, a summary of all the BPM-specific non-functional requirements are given in the table below. These requirements are identified using the same criteria as previous non-functional requirements.

Table 23: Summary of BPM non-functional requirements

Requirement	Motivation
Performance	Performance in the form of measures mentioned for customer service, such as quotation response times and late arrivals should be enhanced due to the BPM implementation.
Realistic	The process models and work instruction documentation should be realistic to use within the business context.
Maintainable	When changes occur in the business process structure, the company should be able to update all relevant processes and documentation.
Complete	The models and documentation must be complete and include all facets relating to BPM.
Compatible	As seen in the context DFD, the process models and documentation must be compatible with the IS used.
User friendly	The process models and the supporting documentation must be user friendly and easy to understand.

6. Solution selection

In the solution selection, the solution alternatives for different process models are presented. The innovate phase is followed in this chapter, with the innovate phase relating to the various identified alternatives.

6.1 Innovate phase

During the innovate phase for BPM implementation, different development solutions are evaluated. These solutions are considered and evaluated for their feasibility using the requirements as stated in Chapter 5. Although all company processes are reviewed, the most significant changes are discussed below.

6.1.1 Site visits

To make moving more accessible to a wider client range, Company ABC has recently acquired two additional sales representatives. These sales representatives have a similar role to consultants, but may do on-site moving surveys instead of letting the client complete an inventory list.

In the initial process model, the site visit request arrives at the switchboard. Since the company previously only had one sales representative, who was fully booked well in advance, switchboard was very selective to the requests they accepted. Where moving survey requests were denied before reaching the sales representative, it was decided that the sales representatives make the decision to deny certain requests. Previously, site visits were done conditionally based on the size of the move. In the new process model, site visit requests are accepted, given that the sales representative and the customer find it meaningful.

This change in policy is due to the company losing customers to competitors for not awarding site visits to the bulk of its clients. According to sales data, site visit quotations are 5% more likely to be accepted than an electronic quotation, with increased accuracy in recording of inventory lists. When the inventory list is more accurate, logistics and the moving team is better prepared for the move. This results in an increase in customer satisfaction with regards to the move and less deviations from the schedule that could displease other customers.

Cost implication

This does however have a cost implication, since two additional sales representative salaries and fuel costs need to be covered. Fixed costs incurred with the salaries will be covered by the increased revenue brought by the additional sales representatives. This assumes that both have the same % hit rate on their customers. This assumption is realistic, considering that both sales representatives will be able to respond quicker to moving survey requests and have more time to tend to each customer. This means that all three sales representatives could likely have higher hit rates. Sales representatives will not have to contest for customers, since the demand for site visits are already enough for three sales representatives.

Initially the company does its site visits at no cost to the potential customer. Doing a site visit/ moving survey does however incur fuel costs and the company could adhere to certain criteria on awarding and scheduling a site visit. Site visits in the same area could be assigned to the same sales representative or if the location is very far off, a site visit request fee can be requested as a deposit for the moving fee.

6.1.2 Quotation to booking

The quotation to booking process is predominantly controlled by the consultants, with consultant processes specifically reviewed to incorporate the expanded information system expansion and to improve customer satisfaction. Consultants are expected to call customers more frequently to increase the rate of accepted quotes, sales in packing materials and other additional services and inventory accuracy.

Initial cost implication

Compelling consultants to call customers more frequently will also have a significant cost implication. Firstly, more telephone calls will lead to higher telephone bills. The biggest impact will however be due to the consultants' time consumption regarding telephone calls. With more telephonic conversation, consultants will have less time to complete pending quotations. This is overcome by the increased speed to complete a quote due to the expanded information system and the increased rate of acceptance due to telephonic response.

6.1.2.1 ISD

As described in the PIECES analysis in Chapter 4, many difficulties were experienced due to the lack of a comprehensive information system. Since a directive from executive management specified the developer for the expansion of the system, information system alternatives are not considered.

A feasibility analysis, as described in Chapter 2, is however used in Table 24 to verify that the solution is sufficient.

Table 24: Feasibility analysis on IS

Type of feasibility	**Expanded diary system**
Operational feasibility	Fits as part of initial IS. Change process model. Users used to the GUI.
Cultural feasibility	No foreseeable problems.
Technical feasibility	Database administrator on-site, but developer in UK. Communication limited, but relationship long-term. Do not need own servers, can rent space.
Economic feasibility	Do not have to pay for upgrades. Can pay developmental costs in segments or once-off.
Schedule feasibility	Still to develop, therefore will take long.
Legal feasibility	Do not have to buy licenses for users.

a. Cost implication

Developmental and annual operating costs are shown in **Error! Reference source not found.** and **Error! Reference source not found.** respectively. Rates and fixed costs were obtained from actual employee salaries, known rates and quoted costs.

Table 25: IS Developmental costs

Development costs	**Cost**
Personnel	R 28,125.00
Student systems analyst (30h @ R75/h)	R 2,250.00
System librarian (20h @ R300/h)	R 6,000.00
Student trainer (15h @ R75/h)	R 1,125.00
Training- approximated time lost by employees @ hourly rate (160 hours/ month)	R 18,750.00
Expenses	R 240,000.00
Alterations to website	R 80,000.00
System development	R 160,000.00
Hardware and software	
Additional screens (5@ R1800)	R 9,000.00
Total developmental costs	**R 268,125.00**

Table 26: IS Annual operating costs

Annual operating costs	**Costs**
Personnel	R 25,000.00
System librarian (100h @ R200/h)	R 20,000.00
Training (5 x 10h @ R100/h)	R 5,000.00
Expenses	**R 2,656.50**
Server space rental	R 2,649.00
Training manuals (5 @ R1.50)	R 7.50
Total annual operating costs	**R 27,656.50**

b. Cos-benefit analysis

With a cost-benefit analysis, economic benefit or loss is compared with tangible benefits received from the proposed solution (Whitten & Bentley, 2007). These benefits are discussed according to the criteria used for the PIECES analysis in Chapter 4.

Table 27: Cost- benefit analysis for IS expansion

PIECES	**Benefit**
Performance	The quote acceptance rate is expected to increase by roughly 20%, this leads to an average increase of R523,564.74 annually. This assumption is made on the performance improvements discussed in this table and include better quotation response times and less mistakes, all leading to more customer referrals and returning customers. These factors add up to a total reduction of costs of R411,550.00 annually.
Information and data	Mistakes occurring because of copying are eliminated, since data is automatically carried over from the website to the quotation system, to the diary system. This makes a significant difference, since 70% of quote requests are received via the company's website. These mistakes cannot dissatisfy the customer and do not have to be resolved by logistics. These mistakes are quantifiable in several ways. Firstly, mistakes are hopefully picked up by the logistics team. The mistake is corrected by the logistics manager who receives roughly three times the salary of the consultant. The time spent on the client is therefore three times more expensive at this stage. It can also only be picked up on the day of the move. If the available volume in the vehicle is less than the volume of the client's belongings, Company ABC must send out a second vehicle and driver, provided there is a vehicle available. The cost of such a mistake would depend on the scale of the problem, but could be anything between R 200 to R 5,000. Lastly, this influences customer service which is described below.
Economic	Total monthly printing costs are R25,000.00. Printing will be reduced by a factor of $\frac{3}{5}$ documents. The new monthly printing costs are therefore reduced by R 15,000.00. $$\frac{2}{5} \times R25{,}000 = R10{,}000.00$$ When consultants are unavailable or absent, colleagues, especially from logistics, have access to their client information immediately. The probability of a consultant being absent was calculated

PIECES	Benefit
	based on the absentees for January to June 2016. Considering the hourly rate for consultants, the possible wasted time to look for documents pertaining to an absent consultant resulted in R2622. For a logistics manager, the cost could potentially be R656. $$\frac{23\ days\ absent\ for\ all\ consultants}{132\ days\ total} \times 0.5h \times 114 \times 22\ days = R219\ monthly$$
Efficiency of people and processes	If consultants spend 8 minutes per quote, just copying data and each consultant does 12 quotes per day, each consultant spends 96 minutes per day copying data. Considering their hourly rate, this adds up to R40,128 monthly. This total is the total cost to the company for non-value adding work. $$\frac{8 \times 12}{60} \times 10 \times 22 \times 114 = R40{,}128.00$$ It is expected that the IS expansion will decrease this amount by 40%.
Service to customers	When consultants are quicker to finish their quotations, they have more time to tend to customers. Engaging with customers personally, gives the customer a greater sense of trust in the company. Customers who are satisfied with their service are more likely to make use of the company's services in the future. Service costs range between R850 to R10,000 with a median of R5,000. Thus, servicing five recurring customers out of 500 monthly customers could increase revenue with R25 000 per month. The company initially does not have any records of recurring customers. It will however be recorded once the company starts using the new quotation system. Customers are also prepared to pay more, for more service and are more likely to use additional services when presented with the option telephonically. This was evident in investigation of additional services as a percentage of sales. For site visits, the average percentage was 26%. For an in-house consultant, the average was 14%. The company has one consultant who has noticed the value of personalised service and calls her customers frequently. Her additional services were 25% of her total sales.

6.1.3 Service day mornings- changeovers

As described in Chapter 2, SMED is a methodology used to reduce changeover time. Company ABC's changeover time is between the arrival of its drivers and packing teams at the depots and the vehicles leaving for their customers. SMED is used to identify internal and external

activities. Two different changeovers are identified. The first is the local changeover, for vehicles doing local services. The second is long-distance changeovers, for vehicles that depart for another depot, after visiting their customers.

Cost implication

Changing certain activities from internal to external activities may have cost implications. For example, when a vehicle's trailer should now be attached before the changeover, the workforce required to complete the activity should be considered. If more than the usual number of night shift employees are required, then there will be a cost implication of additional night shift employee salaries.

For the local changeovers, only activities that will not have a cost implication are changed from internal to external. This means that activities are only done by night shift personnel if they have the capacity to complete the activity. Other activities are assigned to different employees who arrive before the teams and have the capacity to complete the activities.

Long-distance changeovers will have a greater cost implication, since the packing team will be required to pack the truck the night before the vehicle leaves the depot. Depending on the trip details, the team will typically consist of three to four members. If the team packs the vehicle the night before, three to six hours can potentially be saved in transportation time. With the save in transportation time, the vehicle is likely to complete the roundtrip in one day less than customary. The cost implication of the packers coming the night before is therefore negligible, since they are out one day less. If each vehicle can save a day with every trip, the vehicle can add an additional roundtrip per month, which brings an average of revenue of R100,000.

6.1.4 Vehicle scheduling

Since the company's VRP consists of many specialised constraints as seen in Chapter 5, a combination of different VRP's are identified. Each type of VRP has special constraints. The table below contains these VRP's, with their applicable attributes identified.

Table 28: Comparison of different VRP's

VRP type	Applicable attribute/s	Limitation/s
Multi-trip heterogeneous fleet VRP (Coelho et al., 2016)	Vehicles of varied sizes may visit more than one customer per day.	Vehicles should not return to the depot after visiting a customer.
Multi-depot VRP (Shimizu et al., 2016)	Heterogeneous fleet of vehicles. Pickup/delivery time windows. Varying pickup/delivery locations. Multiple objectives.	Either pickup or delivery location at a depot. No possibility of sending multiple vehicles to one customer.
Split deliveries (Belfiore & Yoshizaki, 2013)	Can send multiple vehicles to one customer.	Single depot. No pickup possibilities.

VRP type	Applicable attribute/s	Limitation/s
Mixed Pickup and Delivery (MVRP) (Dechampai et al., 2017)	Delivery and pickup in any sequence along the routes.	Either pickup or delivery must be at depot. Homogeneous vehicle fleet.
HVRPMBTW (heterogeneous fleet, mixed backhauls and time windows) (Belmecheri et al., 2013)	Can have time windows. Can have heterogeneous fleet doing pickups and deliveries.	Either pickup or delivery must be at depot. Single depot.

The VRP must be a unique combination between the above existing VRP's with some special attributes, such as:

1. Sometimes neither pickup, nor delivery of a load happens at a depot.
2. Where some addresses have strict vehicle restrictions, smaller pickup trucks are used to shuttle between the house and the bigger moving truck.
3. Vehicles available for use are subject to availability of drivers. Some drivers do not have legal authorisation to drive some of the bigger trucks and therefore smaller trucks must be used.

Since there is no existing VRP with the required attributes, solution selection cannot only consist selecting an appropriate VRP. Possibilities to develop an appropriate VRP are listed below as candidate solutions.

Table 29: VRP feasibility analysis matrix

	Weight	Candidate 1	Candidate 2	Candidate 3
Description		Develop complete model in-house.	Outsource development for complete model.	Buy a generalised of-the-shelf product.
Operational feasibility	30	Does not initially have the expertise to develop a fully functional model. 4	Could tailor product to comply with operational needs. 9	No tailored product exists, so problems would be more general. 5
Cultural	10	No foreseeable problems. 10	No foreseeable problems. 10	No foreseeable problems. 10
Technical	20	Can interface with company's	Can be programmed to be	Will not directly interface with

	Weight	Candidate 1	Candidate 2	Candidate 3
		tailored IS if employee has competence to do so. 7	compatible with initial IS. 8	company's tailored IS. 5
Economic	20	Cost-effective to use employee. 8	Since problem is very specific, highly tailoring will cost more. 5	Big systems are expensive, but there are many packages available. 6
Schedule	10	May take very long, since employee has other job descriptions. 4	May take long if system is tailored according to needs. 6	Immediately available. 9
Legal	10	No foreseeable issues. 9	Copyright and licensing negotiable. 8	Users must have licences. Product copyright. 7
Weighted score	100	**65**	**72**	**53**

From the above scores, it is clear to see that outsourcing the development of a specially tailored VRP would most benefit the company out of the considered three options. The big financial investment in such a product does however require justification.

Cost-benefit analysis

6.1.5 Summary of cost implications

This section contains a summary of the cost versus benefit as discussed in the previous section. Cost calculations do not include time-value of money, since the monetary value of benefits realised exceed implementation costs within the first year of implementation.

1. Site visit process

Sales representatives have a rough target of R400,000 per month with their cost to company approximately R30,000, including travel costs. The company will therefore increase their profit by roughly R740,000 monthly and satisfy more customers in the process.

Equation 2: Monthly cost-benefit for sales representatives (Equation 2)

$$(400{,}000 - 30{,}000) \times 2 = R740{,}000.00$$

2. Consultants process

Time saved from doing quotes will be used to communicate with customers. One employee who spends more time on the phone with her customers, has an average of 11% more in sales of additional services than her colleagues.

Equation 3: Annual cost-benefit from new consultant process (Equation 3)

$$2{,}617{,}823.73 \times 11\% = R287{,}960.61$$

3. ISD

The below cost-benefit calculations were made according to the revenue in 2016. Since the revenue has been increasing by approximately 21% during the last two years, using the same annual revenue is a conservative assumption.

Equation 4: Cost- benefit of ISD for first year (Equation 4)

$$654{,}455.93 - (268{,}125 + 27{,}651.50) = \text{R}358{,}679.43$$

Equation 5: Cost-benefit of ISD in subsequent years (Equation 5)

$$654{,}455.93 - 27{,}651.50 = \text{R}626{,}804.43$$

4. Quick change-overs

Since each long-distance vehicle will be able to make an extra trip every month, the average revenue for these vehicles' round-trips are multiplied by the number of vehicles doing round trips. The salary of packers working an extra day per round trip is also taken into consideration.

Equation 6: Monthly cost-benefit for quick changeovers (Equation 6)

$$\big((100{,}000 \times 2) + (75{,}000 \times 1)\big) - 1{,}800 = R273{,}200.00$$

5. VRP cost vs expected increased revenue

The fuel and other costs relating to vehicle scheduling saved can only be realistically compared when comparing the schedules of the VRP to the manual schedules. Since outsourcing development of such a model can be expensive, the costs may outweigh the benefits for the company at present. When presenting the results to company management, it was decided that the CFO would wait before making another big capital investment in technology.

7. Solution construction

The solution construction includes phases six and seven of the BPM implementation steps. The people phase relates to the impact of process changes on stakeholders and the develop phase gives an overview of the solution.

7.1 People phase

In this section, the business process models and supporting documentation are developed for the entire organisation. This includes the documentation stipulated in Table 30 below with its indicated location. All documents are grouped according to organisation roles as seen in Figure 21 below.

Table 30: Solution construction deliverables

Documentation	Document location
BPMN process models	Section 11.9:Appendix I New process models
Information system training manuals	
Customer communication scripts	
Role descriptions	

New business process models are developed for each role, with the various roles seen in the figure below.

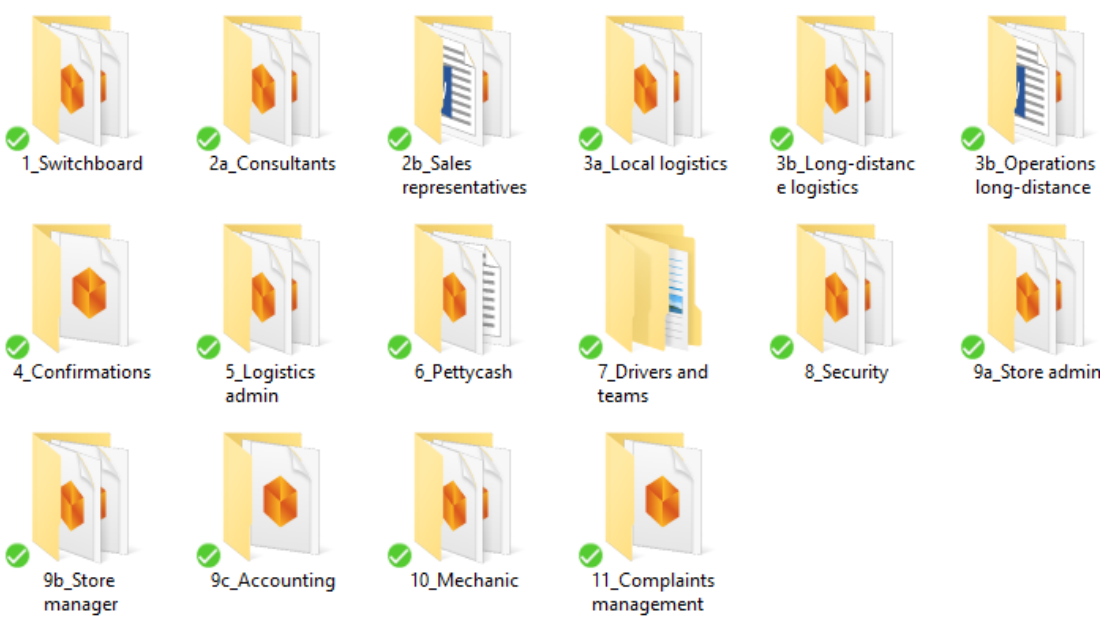


Figure 21: Specified organisation roles

For example, the consultant role is part of five main processes. These process models are referred to as process model C1 to process model C5.

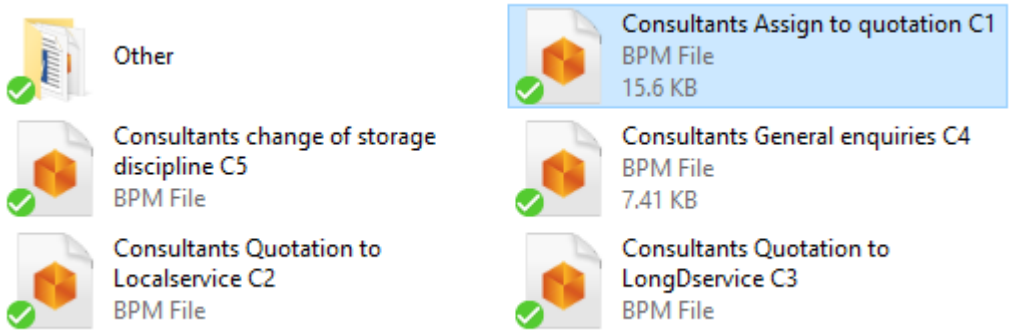


Figure 22: Five main process models for consultant role

An extract of process model C1 is shown below.

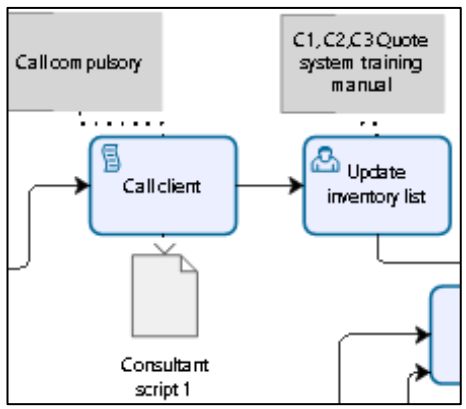


Figure 23: Extract of process model C1

Within the process model, reference is made to a “Consultant script 1” and a “Quote training system manual.”

7.1.1 Scripts

As part of the process model supporting documentation, scripts are developed to standardise communication to customers.

Script nr	Process model nr	Script	Reason
1	C 1	(Identify customer profile: Signatures, item values, addresses.) Good day, my name is **name** and I'm calling from Thank you for sending your quote request. Do you have a few minutes to discuss your quote request with me? (Record date and time before making notes on quotation system.) High-value or fragile items (If items are of very high value ask client if a viewing by supervisor or sales representative is necessary.)	Make call compulsory (Before sending quote) Identify high-value, fragile, difficult, missing items on inventory list, big restrictions.

Figure 24: Extract of consultant script 1

The process model in Figure 23 also refers to a quote training manual.

7.1.2 Training manual

This is the training manual developed for the extension of the diary system, pertaining specifically to quotation management. The below figure shows an extract of the training manual developed for consultant specific tasks.

2	Under "All quotes" there is a list of assigned quotes and the relevant consultant. To update the contact details or inventory list, select the "Update" button to the far right.	

Figure 25: Extract of consultant training manual

7.1.3 Role description

A role description for every role in Figure 21 is created. For the consultant, this role description contains information on:

1. Purpose

To serve the customer by accurate telephonic/ electronic data gathering in terms of inventory, address and other move-related information and expert advice. Providing an accurate quote while maximizing revenue and customer satisfaction.

2. KPA’s

KPA 1 Swift quote and query response

KPA 2 Sales revenue (transport, storage and packing/wrapping)

KPA 3 Generating accurate quote

KPA 4 Prepared move

3. Responsibilities

Performance Area	Responsibility	Ref:
KPA 1	- Respond to assigned quote enquiries and existing client enquiries.	- Process model C 1 and C 4
KPA 2	- Sell and promote services offered by Company ABC.	- Process model C 1 and C 2
KPA 3	- Generate accurate quotes.	- Process model C 1.1
KPA 4	- Make booking and ensure all information is complete before logistics manager follows-up.	- Process model C 2 and C 3

4. Daily/ weekly/ monthly deliverables

Figure 26: Extract of role description deliverables

5. Skills and education

KPA	Skill
Swift quote and query response	1. Sufficient telephonic communication skills 2. Training on quotation system
Sales revenue	1. Sufficient telephonic communication skills 2. Good promotional skills
Accurate quote	1. Training on quotation system 2. Knowledge on typically challenging items/ situations
Prepared move	1. Knowledge on typically challenging items/ situations

6. Competencies

Competency	Level
Basic Training	Do
Consultant Training	Do
Service and Maintenance	Informed
Transport and Logistics	Do
Procurement	Informed
Customer Satisfaction, Communication and Telephonic Selling	Do

7. Measures of success

Measures for success for employees were derived from balanced scorecard as described in section 5.1.

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Monthly sales revenue (Will differ between consultants. Focus on additional services)	N/A	N/A	N/A	N/A	N/A
Monthly number of complaints	5	4	2	1	0
Number of revised quotes	5	4	3	1	0
Quotation response time	120 min	90 min	60 min	30 min	15 min

8. Incentives

Commission on personal monthly sales revenue.

7.1.4 SMED

SMED is used to reduce changeover time for local and long-distance moves.

7.1.4.1 Local changeovers

Local changeovers happen every morning, where drivers and teams arrive at 6 AM to conduct local moves.

1. Initial activity list

A list of activities initially taking place in before and during changeover time is identified.

Table 31: Initial local changeover activities

Internal (Done after teams arrive)	External (Done before teams arrive)
Receive job documentation.	Crated out-of-store if Martin was on duty.
Teams come to ask for supervisor to unlock storage.	Vehicle stock checked (trolley, tools and blankets).
Uncrated out-of-store (single load).	Vehicle cleaned.
Uncrated out-of-store (multiple load).	Packing material packed according to report.
Crated out-of-store if Kobus was on duty night before.	Basic vehicle/ trailer readiness.
Engines run for 15 min.	Fuel
Water on windscreens.	
Trailers attached.	
Spar.	
Roll call.	
Exchanges in personnel due to roll call.	
Quick fixes reported on vehicle/ trailer readiness.	
Changes made for vehicle/ trailers not ready for service.	

2. Added internal activity

Team briefing instead of just handing out envelopes. There are already three definite supervisors present to conduct briefing.

3. Internal to external activity

Some internal activities are identified and changed into external activities.

Table 32: Local internal to external activities

Internal to external activity	How?
Teams come to ask for supervisor to unlock store. Rather than changing to external, eliminate activity.	Supervisors should be prepared/ briefed that they need to unlock stores.
Uncrated out-of-store (single load).	Security load storage night before.
Engine run for 15 min.	In winter for engines to warm up and to build up air pressure.
Water on windscreen to defrost.	In winter when windscreens are frosted.
Smaller trailers attached.	Security can attach smaller trailers (requiring less man power) the night before.
Quick fixes to vehicles and trailers.	Mechanic can start fixing before teams arrive, since problems are reported night before.
Changes made for vehicle/ trailers not ready for service.	Mechanic can let logistics know before teams arrive if a vehicle/ trailer needs to be exchanged.

4. Motivation for internal activities

Some activities can only be done once drivers and teams arrive.

Table 33: Motivation for local internal activities

Internal	Motivation
Uncrated out-of-store (multiple load).	It is better to have team pack truck themselves, so they know where loads are.
Crated out of store if Kobus was on night duty.	Kobus cannot handle a forklift used to pack crates. Must only be done after trucks were cleaned.
Bigger trailers attached.	More manpower needed to attach trailer.
Spar	Teams stop there every morning. Do not want to change.
Roll call	Must be done right before vehicles leave.
Exchanges in personnel due to roll call.	Last minute adjustments made to diary.
Receive job documentation.	Must receive documentation service day.

5. Updated activity list

Activities are split into new internal and external activities. These activities become part of the business process model.

Table 34: Updated local activity list

Internal (Done after teams arrive)	External (Done before teams arrive)
Roll call (Divided into 3 supervisors).	Vehicle cleaned.
Exchanges in personnel due to roll call.	Vehicle stock checked (tools, blankets, etc.)
Receive job documentation.	Basic vehicle/ trailer readiness.
Team briefing (By assigned supervisor).	Packing material packed according to report.
Bigger trailers attached.	Crated out-of-store if Martin was on duty.
Uncrated out-of-store (multiple load).	Uncrated out-of-store (single load).
Crated out of store if Kobus was on night duty.	Fuel
Spar	Quick fixes to vehicles and trailers (mechanic).
	Changes made for vehicle/ trailers not ready for service (logistics).
	Engine run for 15min.
	Water on windscreen.
	Bigger trailers attached.

7.1.4.2 Long-distance changeovers

Long-distance changeovers roughly take place every second day and usually comprise of only one truck at a time.

1. Initial activity list

A list of activities initially taking place before a long-distance trip is shown below.

Table 35: Initial long-distance activity list

Internal (Done after arrival)	External (Done before arrival)
Roll call	Clean vehicle
Adjustments made after roll call.	Check vehicle tools
Do vehicle readiness test (more advanced than basic tests).	Basic vehicle readiness checks
Pack vehicle.	Fuel
Receive job documentation.	

2. Internal to external

Activities identified to change to external activities.

Table 36: Long-distance internal to external activity list

Internal to external	How?
Do vehicle readiness test (more advanced than basic tests).	Can be done first thing in the morning.
Pack vehicle	A very timely activity- can take up to half a day. Let team come in night before driver to pack vehicle.

Internal activities identified to stay internal with motivation.

Table 37: Internal long-distance activities

Internal	Motivation
Roll call	Must be done right before vehicles leave.
Adjustments after roll call.	Last minute adjustments made to diary.
Receive job documentation.	Must receive documentation service day.

3. Updated activity list

The list of updated long-distance activities is seen below.

Table 38: Updated long-distance activity list

Internal (Done before driver arrival)	External (Done after driver arrival)
Roll call	Clean vehicle
Adjustments after roll call.	Check vehicle tools
Receive job documentation.	Basic vehicle readiness checks
	Fuel
	Do vehicle readiness checks (Checklist).
	Pack vehicle (team night before).

7.2 Develop phase

This phase gives an overview of the overall solution. A business process management project firstly requires a strategy. A company strategy is developed during the requirements elicitation using PESTEL analysis, Porter's five forces and the balanced scorecard approach. The balanced scorecard approach is used to identify and align business processes to company strategy. Identified processes are then reviewed together with other process documentation, like role descriptions, training manuals and communication scripts. Training manuals refer to the expanded

information system training manuals developed for the expansion of the company's information system. SMED is used to reduce changeover time on service mornings for local and long-distance vehicles. With the consideration for the development of a tailored VRP being outsourced, the cost-benefit analysis shows that the immediate cost to the company outweighs the benefit of the product.

7.2.1 Development phase risks

During the development phase, risks are developed with their mitigation strategies (Jeston & Nelis, 2006).

Table 39: Development phase risks and mitigation strategies

Risk	**Mitigation strategy**
Developed solution does not meet requirements.	To ensure that the developed solution adheres to all requirements as stated in Chapter 5, stakeholders are regularly consulted to establish the agreed business requirements and process architecture.
Developed solution is not compatible with all external interfaces.	To ensure that the solution is compatible with all external interfaces, the necessary interfaces are identified during the requirements elicitation phase.
Finding too many errors in system testing.	To ensure that all requirements are explicitly stated during the requirements elicitation phase and to do basic testing before letting users test.

8. Implementation results

The implementation phase refers to the physical implementation of the project with results of the phase including trained and motivated staff and improved processes complying with requirements as stated in Chapter 5.

8.1 Implementation approach

The basic implementation plan was used as described in the launch pad phase in Chapter 5, with a combination implementation scenario (Jeston & Nelis, 2006). This implementation scenario indicates that different segments of the proposed solution are implemented using different implementation approaches. The IS was implemented using a big bang implementation method, where the solution is introduced in one major overhaul (Jeston & Nelis, 2006). The rest of the solution was implemented using the parallel implementation scenario, where the proposed changes are implemented step-by-step (Jeston & Nelis, 2006).

Since the new process models were developed for the extension of the IS, the process models could only be implemented once the information system was complete. Employees received departmental training on the interpretation of their process models and communication scripts before the training on the new system. Once the IS was complete, employees received training manuals and attended one four-hour group training session and additional individual assistance where required.

During training, the reasons for the changes were communicated to the employees. Their individual benefit as well as the company's benefit was highlighted to ensure that employees were positive toward the changes.

SMED processes were not implemented, but evaluated by logistics managers.

Since the cost-benefit analysis indicated that the development of a company-specific VRP should be outsourced, no VRP solution is implemented for this project. A recommendation on the way forward is however made in the following chapter.

8.2 Implementation phase risks

During the implementation phase, risks are developed with their mitigation strategies (Jeston & Nelis, 2006).

Risk	**Mitigation strategy**
Stakeholders are not kept informed on the project.	Project progress must be communicated to all stakeholders throughout the project lifetime.
Core project team is unable to deal with all problems and enquiries at the start of implementation.	Ensure that there are enough capable assistants to help users through implementation.
Testing and training brings business to a halt.	Training is done after hours and before implementation.

9. Conclusion and recommendation's

Conclusions and recommendations are discussed separately for implemented and non-implemented processes.

9.1 Realise value phase

In the realise value phase, the benefits of the solutions are compared to the requirements as stated in the requirements elicitation.

9.1.1 Implemented

Implemented processes are evaluated according to implementation results in a benefit matrix and interviews with key stakeholders.

Process models and IS

Interviews were conducted throughout the project lifetime and adjustments to the solution were made iteratively to include as many of the recommendations as possible. The following results were obtained from the last set of interviews after implementation.

Summative evaluation

In the summative evaluation, employees are interviewed to establish whether especially non-functional requirements, as stated in the requirements elicitation, are met.

Table 40: Summative evaluation

Interviewer question/ objective	**Corresponding functional or non-functional requirement**	**Summary of interviewee responses**
Q1 Are the process models easy to follow and understand?	User friendly Maintainable	Users mostly find the process models easy to understand, once the basic principles of BPMN are explained to them.
Q 2 Are the interfaces between process models and supporting documentation clear?	User friendly Maintainable	As with the process models, users can follow the different documents once its interfaces are explained.
Q 3 Do you feel that the new process models and corresponding KPIs are realistic?	Realistic	Users are mostly positive about new KPIs. Some uncertainty was detected with consultants finding time to interact with customers more. That uncertainty was however overcome when users saw that quotations could be completed much quicker on the new IS.

Interviewer question/ objective	Corresponding functional or non-functional requirement	Summary of interviewee responses
Q 4 Do you believe that the extension of the IS will assist or hinder you in completing your everyday tasks?	Performance Compatible	Users are very positive about a system that could quicken their daily tasks. Users are especially delighted by the system's user-friendly interface.
Q 5 Are the process models complete, or do you feel that there are missing steps?	Complete	Employees believe that the process models are complete, since the student iteratively corrected and added steps throughout the project lifetime.
Q 6 Are there any additional functionalities that you would like to see in the IS?	Complete	Top management identified that they would like to add some reports to the system, but that the system does not lack any functionality. The long-distance logistics manager, however pointed out that he would like to incorporate some extra functionality regarding the long-distance sheets and bookings.

From the summative evaluation, it is evident that the process models, corresponding documentation and IS were successfully implemented according to the requirements elicitation.

Quantitative evaluation

When considering the implementation results, it is important to reflect that the new processes and information system were only implemented before August 2017 month-end. To get a complete view of implementation success, data should be taken over a longer period to ensure that both early and late requests are considered. Data such as the average number of quotes, the time spent on a quote and the printing costs are relatively independent of the implementation date. Although performance may have improved since implementation, it would be valuable to see if there are even greater long-term improvements in areas such as quote response time.

The benefits discussed in Chapter 6 are long-and short-term benefits. Since only a month has passed since implementation, the benefit summary matrix below shows the progress made in some of the short-term wins. The values in the below table were obtained from the IS and time studies as indicated.

Table 41: Benefit tracking matrix

Benefit	**Measure**	**Target**	**Actual achievement**	**Previous performance**	**Status**
More quotes distributed per day	Average number of quotes per employee per day	$12 \times 0.4 + 12 = 17\ quotes$	19	12 if completed with care	Since the time to generate customer quotes is halved, employees have time to do more quotes per day and still call the customers at the designated steps in the quotation process.
Quicker quote generation	Average time spent on a quote	$-15 \times 0.4 + 15 = 9\ minutes$	7 minutes	15 minutes	The time taken to complete the actual quote has been halved. This was tested by mock-runs done by consultants and was elaborated on in the below time study, quote response time. This time improvement is due to process optimisation and semi-automation. This measure is expected to drop still, as employees are not yet used to the new system and processes.
Quicker quote response time	Time from quote request until quote is sent	Below 1 hour	1 hour and 48 minutes	2 hours and 40 minutes	Although the target has not yet been reached, the quote response time has come done with more than 50 minutes. The time study for previous performance only started measuring at a later stage in the process, namely "assign consultant". The quote response time is expected to come down as employees get more used to the new system. Both time studies are included in Appendix F: Quotation time study.

Benefit	**Measure**	**Target**	**Actual achievement**	**Previous performance**	**Status**
Increased quote acceptance	% quote acceptance	40%	$\frac{Quotes\ accepted}{Quotes\ generated} = 27\%$	19%	This figure is expected to only reach its target in the next year. With an improvement of overall customer service, the company is expected to increase customer retention and referrals. The company experienced a 28.9% growth in revenue from the corresponding month in the previous year. This amounted to an additional 7.9% growth in revenue when excluding the normal growth curve of 21%.
Decreased operational costs	Printing cost	R10,000.00	R12,500.00	R 25,000.00	Printing cost is expected to decrease immediately. Where stationary usually barely lasted 31 days, the last month's order was taken 47 days from the previous order. The procurement department believes that orders will be placed every two months from now on instead of monthly.
Fewer errors on inventory lists	Number of load mistakes reported	Less than 3	8	13	Load mistakes are expected to drop immediately, but may decrease more after time. The goal is to ensure that consultants communicate with their clients enough to ensure that no items are missed when on the inventory form.
Increased additional service sales	% additional service sales of total sales	25%	19%	14%	A greater focus on customer intimacy resulted in a 5% average increase in additional services. Once employees are settled into the new system and processes, they are expected to call more customers and make more sales for additional services.

Benefit	Measure	Target	Actual achievement	Previous performance	Status
Increased site-visit customers	Total quotes on site-visit customers	$R365{,}512 \times 3 = R1{,}096{,}536$	R666,345.00	R365,512.00	Although the actual achievement is still below the target, it must be considered that new site-visit consultants required training during September. The data was also extracted from the system before month-end, which could have potentially increased the amount significantly.

9.1.2 Non-implemented

Non-implemented processes are evaluated by means of interviews with key stakeholders.

9.1.2.1 SMED

The quick changeovers were evaluated in interviews with the logistics managers and top management. Although local quick changeovers will not necessarily save significant cost or increase revenue, it could improve customer service if more teams arrive on time for their first and subsequent customers. This could be a quick win, since all employees are already present early in the morning.

Top management is evidently more excited about the long-distance quick changeovers, which could increase monthly revenue by up to R275,000.00. The local logistics manager pointed out that packers and drivers were used for local and long-distance services interchangeably. If packers were used the evening before the long-distance move, there could be a shortage of local packers and drivers. This could be overcome by acquiring more packers and drivers, which management is considering already because of high company growth.

9.1.2.2 VRP

It is recommended that Company ABC consider investing capital into outsourcing the development of a company specific VRP. Using a VRP instead of manual vehicle scheduling could contribute to cost saving and less vehicle carbon emissions. This could increase profit or enable the company to lower service prices and could improve their company image by "going green."

9.2 Sustainable performance phase

During this phase, methods are identified to continuously evaluate process quality and to ensure that implementations are followed through.

Feedback loops are introduced to evaluate the process performance to its objectives and occur in feedforward, monitoring and feedback loops (Jeston & Nelis, 2006). During feedforward loops, employees and managers are expected to anticipate the effects on process and employee

goals. Management must continuously monitor employee and process performance against stated goals and evaluate conformance using a feedback loop if goals were not reached.

Employees must be rewarded for initiatives striving toward sustainability. As an example, some employees receive incentive and could look for ways to increase sales. When overall sales increase, the employees' sales also increase and so do their incentives. Employees who do not receive incentives, could receive rewards bonusses for identifying improvement initiatives.

10. References

Belfiore, P. c., & Yoshizaki, H. T. Y. (2013). Heuristic methods for the fleet size and mix vehicle routing problem with time windows and split deliveries. *Computers & Industrial Engineering, 64*(2), 589-601.

Belmecheri, F., Prins, C., Yalaoui, F., & Amodeo, L. (2013). Particle swarm optimization algorithm for a vehicle routing problem with heterogeneous fleet, mixed backhauls, and time windows. *Journal of Intelligent Manufacturing, 24*(4), 775-789.

Chinosi, M., & Trombetta, A. (2012). BPMN: An introduction to the standard. *Computer Standards & Interfaces, 34*(1), 124-134.

Coelho, V. N., Grasas, A., Ramalhinho, H., Coelho, I. M., Souza, M. J. F., & Cruz, R. C. (2016). An ILS-based algorithm to solve a large-scale real heterogeneous fleet VRP with multi-trips and docking constraints. *European Journal of Operational Research, 250*(2), 367-376.

Coyle, J. J. (2017). *Supply chain management : a logistics perspective* (10e. ed.). Australia :: Cengage Learning.

Dechampai, D., Tanwanichkul, L., Sethanan, K., & Pitakaso, R. (2017). A differential evolution algorithm for the capacitated VRP with flexibility of mixing pickup and delivery services and the maximum duration of a route in poultry industry. *Journal of Intelligent Manufacturing, 28*(6), 1357-1376. doi:10.1007/s10845-015-1055-3

Dietz, J. L. G. (2006). *Enterprise ontology : theory and methodology*. Berlin ;: Springer.

Godbout, A. J. (2000). Managing core competencies: the impact of knowledge management on human resources practices in leading-edge organisations. *Knowledge and Process Management, 7*(2), 76-86.

Gutin, G., & Punnen, A. (2006). The traveling salesman problem. *Discrete Optimization, 3*(1), 1.

Jayswal, A., Li, X., Zanwar, A., Lou, H. H., & Huang, Y. (2011). A sustainability root cause analysis methodology and its application. *Computers and Chemical Engineering, 35*(12), 2786-2798.

Jeston, J., & Nelis, J. (2006). *Business process management : practical guidelines to successful implementations* (1st ed. ed.). Burlington, MA :: Butterworth-Heinemann.

Kaplan, R. S., & Norton, D. P. (1996a). *The balanced scorecard : translating strategy into action*. Boston :: Harvard Business Review Press.

Kaplan, R. S., & Norton, D. P. (1996b). strategic learning & the balanced scorecard. *Strategy & Leadership, 24*(5), 18-24.

Nooteboom, B. (2007). Service value chains and effects of scale. *Service Business, 1*(2), 119-139.

Perinforma, A. P. C. (2015). *The essence of organisation : an introduction to enterprise engineering* (2nd revised edition. ed.). [Netherlands] :: Sapio Enterprise Engineering.

Porter, M. E. (2004a). *Competitive advantage*. New York ;: Free.

Porter, M. E. (2004b). *Competitive strategy : techniques for analyzing industries and competitors* (1st Free Press export ed. ed.). New York :: Free Press.

Shimizu, Y., Sakaguchi, T., & Yoo, J.-K. (2016). A hybrid method for solving multi-depot VRP with simultaneous pickup and delivery incorporated with Weber basis saving heuristic. *Journal of Advanced Mechanical Design, Systems, and Manufacturing, 10*(1), JAMDSM0004.

Shingō, S. (1985). *A revolution in manufacturing : the SMED system*. Stamford, Conn. :: Productivity Press.

Stake, R. E. (2004). *Standards-based & responsive evaluation*. Thousand Oaks, Calif. :: Sage.

Steyn, H., Dekker, A. H., Kuschke, B., Van Eck, B. P. S., & Visser, K. (2016). *Project management : a multi-disciplinary approach* (Fourth, revised edition. ed.). Pretoria, South Africa :: FPM Publishing.

Treacy, M., & Wiersema, F. D. (1996). *The discipline of market leaders : choose your customers, narrow your focus, dominate your market*. London :: HarperCollins.

Whitten, J. L., & Bentley, L. D. (2007). *Systems analysis and design methods* (7th ed. ed.). Boston :: McGraw-Hill/Irwin.

Winston, W. L., Venkataramanan, M. A., & Goldberg, J. B. (2003). *Introduction to mathematical programming. Operations research. Volume 1* (4th ed. ed.). Pacific Grove, CA :: Thomson/Brooks/Cole.

11. Appendices

Appendix A: Signed Industry Sponsorship Form

Department of Industrial & Systems Engineering
Final Year Projects
Identification and Responsibility of Project Sponsors

All Final Year Projects are published by the University of Pretoria on *UPSpace* and thus freely available on the Internet. These publications portray the quality of education at the University and have the potential of exposing sensitive company information. It is important that both students and company representatives or sponsors are aware of such implications.

Key responsibilities of Project Sponsors:

A project sponsor is the key contact person within the company. This person should thus be able to provide the best guidance to the student on the project. The sponsor is also very likely to gain from the success of the project. The project sponsor has the following important responsibilities:

1. Confirm his/her role as project sponsor, duly authorised by the company. Multiple sponsors can be appointed, but this is not advised. The duly completed form will considered as acceptance of sponsor role.
2. Review and approve the Project Proposal, ensuring that it clearly defines the problem to be investigated by the student and that the project aim, scope, deliverables and approach is acceptable from the company's perspective.
3. Review the Final Project Report (delivered during the second semester), ensuring that information is accurate and that the solution addresses the problems and/or design requirements of the defined project.
4. Acknowledges the intended publication of the Project Report on UP Space.
5. Ensures that any sensitive, confidential information or intellectual property of the company is not disclosed in the Final Project Report.

Project Sponsor Details:

Company:	
Project Description:	Moving Forward (Process Engineering, Information System Design, Optimisation)
Student Name:	Jana Taute
Student number:	14040639
Student Signature:	
Sponsor Name:	
Designation:	
E-mail:	
Tel No:	
Cell No:	
Fax No:	
Sponsor Signature:	

11.2 Appendix B: Ethics approval

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Engineering, Built Environment and Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en Inligtingtegnologie / Lefapha la Boetšenere, Tikologo ya Kago le Theknolotši ya Tshedimošo

Reference number: EBIT/36/2017 14 June 2017

Ms J Taute
Department Industrial and Systems Engineering
University of Pretoria
Pretoria
0028

Dear Ms Taute,

FACULTY COMMITTEE FOR RESEARCH ETHICS AND INTEGRITY

Your recent application to the EBIT Research Ethics Committee refers.

Conditional approval is granted.

This means that the research project entitled moving forward" is approved under the strict conditions indicated below. If these conditions are not met, approval is withdrawn automatically. The applicant is not required to submit an updated application.

Conditions for approval

- Ensure that data are stored by using password protection and encryption.

This approval does not imply that the researcher, student or lecturer is relieved of any accountability in terms of the Code of Ethics for Scholarly Activities of the University of Pretoria, or the Policy and Procedures for Responsible Research of the University of Pretoria. These documents are available on the website of the EBIT Ethics Committee.

If action is taken beyond the approved application, approval is withdrawn automatically.

According to the regulations, any relevant problem arising from the study or research methodology as well as any amendments or changes, must be brought to the attention of the EBIT Research Ethics Office.

The Committee must be notified on completion of the project.

The Committee wishes you every success with the research project.

Prof JJ Hanekom
Chair: Faculty Committee for Research Ethics and Integrity
FACULTY OF ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

11.3 Appendix C: Project plan

11.3.1 BPM project plan

The product plan is based on the Gantt chart in section 11.3.1 with specifics visible in Figure 29: BPM Project detail. Project specific resources and constraints are discussed below.

11.3.1.1 Resources, constraints, budget

Before implementation, the project had to prove to be self-funding, so essentially no direct budget was given for the project. Constraints were that the student acting as project manager had limited time for the project and therefore had to finish within the constraints of the module deadlines. The organisation had no industrial engineers and no prior knowledge to BPM, so successful development and implementation was critical to prove its worth to the organisation. The student therefore had no human resources internal to the company for BPM knowledge.

For the student's own budget, the student did not need money for transport or living, since the offices are close to the student's home. The student received payment as part-time worker and used the money to accord for miscellaneous costs during the project lifetime.

11.3.2 ISD project plan

The project plan is divided into subsections and is the base of the execution of the project.

11.3.2.1 Resources, constraints, budget

Because the system is an expansion of an existing system, the customer requirements were very specific and resources used, like the software developer, were predetermined. A time constraint of three months was given from requirements elicitation to implementation. No specific budget constraints were set.

11.3.2.2 Timeline

A timeline can be seen in section 11.3.2 with details in Figure 28: ISD Project detail.

11.3.3 OR project Plan

The timeline for the project is given in section 11.3.3, with specific details in Figure 30: OR Project detail.

11.3.3.1 Resources, constraints, budget

A resource required for execution of this project is knowledge from the operations manager initially doing job scheduling. Software resources may be necessary to run the model which mostly have freeware alternatives available.

There are no time constraints on the project except those instated by the BPJ modules. Because the company already had a working IS on which bookings are manually scheduled, management considered including the model in the system.

11.4 Appendix D: Detailed Gantt chart

Initial detailed Gantt charts follow for the main project and its subsections.

11.4.1 Project overview

	Task Name	Duration	Start	Finish	Resource Names
1	Fist site visit	1 day	Thu 2/2/17	Thu 2/2/17	Student,Project Sponsor
2	Problem identification	11 days	Thu 2/2/17	Thu 2/16/17	Project Sponsor,Project su
3	Project topic selection	8 days	Thu 2/16/17	Sat 2/25/17	Student
4	**BPJ410**	**61 days**	**Mon 3/6/17**	**Mon 5/29/17**	
5	Project proposal	19 days	Mon 3/6/17	Thu 3/30/17	Student
6	Preliminary report	31 days	Mon 4/3/17	Mon 5/15/17	Student
7	Interim presentation	7 days	Fri 5/19/17	Mon 5/29/17	Student
8	**ISD Project**	**103 days**	**Wed 2/8/17**	**Fri 6/30/17**	
15	**BPM Project**	**118 days**	**Thu 2/16/17**	**Mon 7/31/17**	
30	**OR Project**	**88 days**	**Thu 2/16/17**	**Mon 6/19/17**	

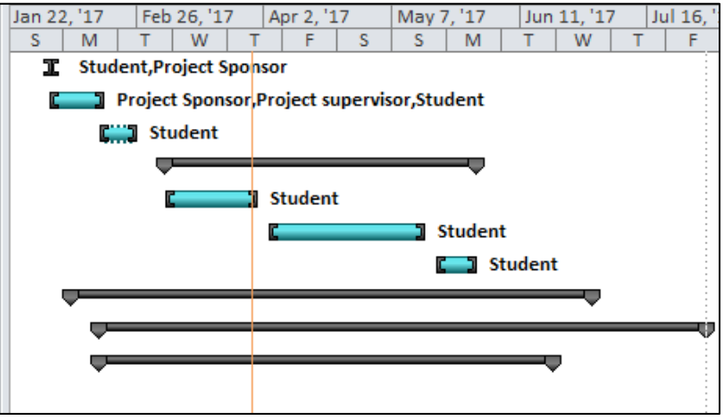


Figure 27: Overview of Project Gantt chart in Microsoft Office Project

11.4.2 ISD Project overview

	Task Name	Duration	Start	Finish	Resource Names
4	**BPJ410**	**61 days**	**Mon 3/6/17**	**Mon 5/29/17**	
8	**ISD Project**	**103 days**	**Wed 2/8/17**	**Fri 6/30/17**	
9	Fact-finding for PIECES	10 days	Wed 2/8/17	Tue 2/21/17	Student,Consultants
10	Requirement specifications and deliverables	3 days	Wed 2/22/17	Fri 2/24/17	Student,Consultants,Proje Sponsor
11	Evaluation of alternatives	1 day	Thu 3/23/17	Thu 3/23/17	Software developer,Student
12	Solution Construction	38 days	Thu 3/23/17	Mon 5/15/17	Software developer
13	Implentation (final documentation)	24 days	Mon 5/15/17	Thu 6/15/17	Student
14	Evaluation	11 days	Fri 6/16/17	Fri 6/30/17	Student,Project Sponsor

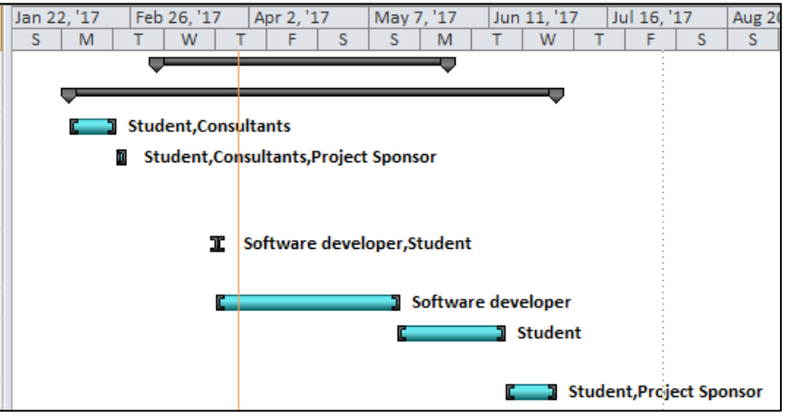


Figure 28: ISD Project detail

11.4.3 BPM Project overview

	Task Name	Duration	Start	Finish	Resource Names	Add Nev
15	**BPM Project**	**118 days**	**Thu 2/16/17**	**Mon 7/31/17**		
16	Problem analysis	6 days	Thu 2/16/17	Thu 2/23/17	Student	
17	**Requirements elicitation**	**39 days**	**Tue 2/28/17**	**Fri 4/21/17**	**Other employees,Project Sponsor,Student**	
22	Innovation: Redesign of processes	18 days	Mon 4/24/17	Wed 5/17/17	Student	
23	**Solution construction**	**17 days**	**Mon 4/24/17**	**Tue 5/16/17**		
24	People: Role description and performance measures	11 days	Mon 4/24/17	Mon 5/8/17	Project Sponsor,Student	
25	Devolp phase requirements	7 days	Mon 5/8/17	Tue 5/16/17	Student	
26	Implementation	21 days	Thu 6/22/17	Thu 7/20/17	Project Sponsor,Student	
27	**Evaluation**	**21 days**	**Mon 7/3/17**	**Mon 7/31/17**		
28	Realise value: Evaluate benefits	21 days	Mon 7/3/17	Mon 7/31/17	Student	
29	Sustainable performance: Mechanisms for improvement opportunities	6 days	Mon 7/3/17	Mon 7/10/17	Student	

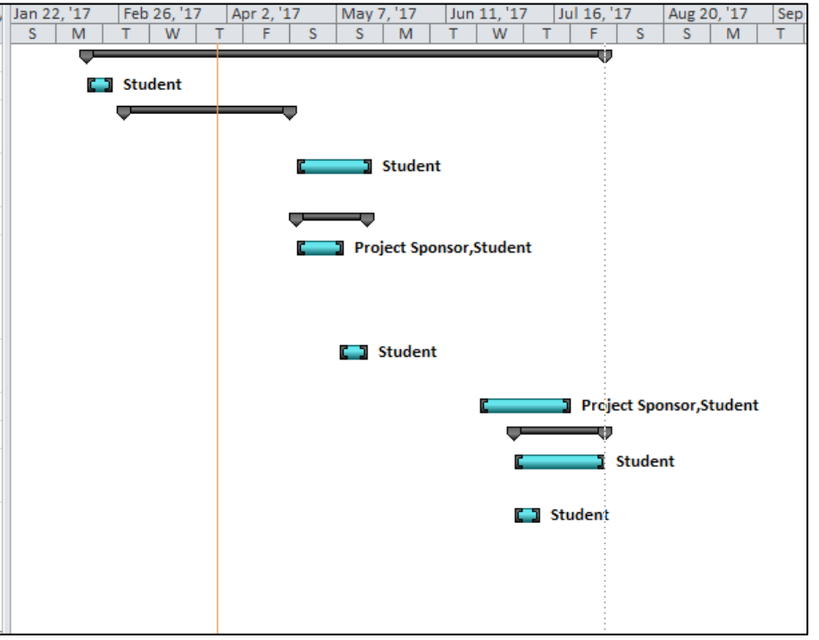


Figure 29: BPM Project detail

11.4.4 OR Project overview

	Task Name	Duration	Start	Finish	Resource Names
30	**OR Project**	**88 days**	**Thu 2/16/17**	**Mon 6/19/17**	
31	Problem analysis	33 days	Thu 2/16/17	Mon 4/3/17	Student
32	Requirements analysis	3 days	Mon 4/10/17	Wed 4/12/17	Operations manager,Stud
33	Evaluation of alternative model types	3 days	Wed 4/12/17	Fri 4/14/17	Student
34	Model construction and verification	32 days	Sat 4/15/17	Mon 5/29/17	Student
35	Presentation to management	1 day	Wed 5/31/17	Wed 5/31/17	Operations manager,Project
36	(Conditional) Implementation and evaluation	11 days	Mon 6/5/17	Mon 6/19/17	Operations manager,Student

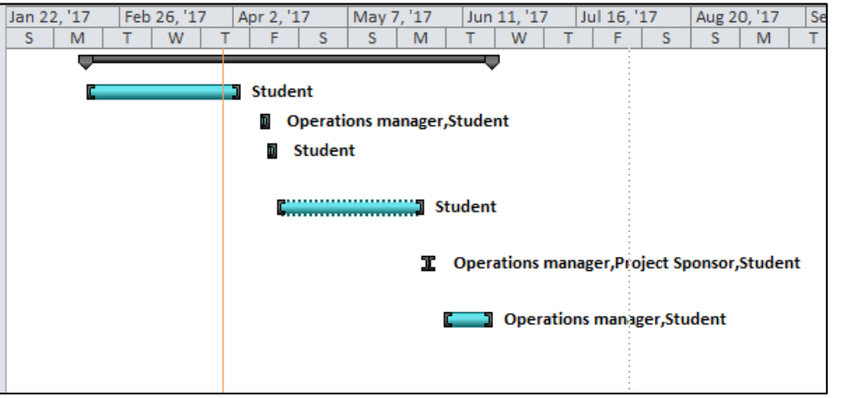


Figure 30: OR Project detail

11.5 Appendix E: Detailed steps in BPM Literature review

Relevant steps to be taken within each of the phases described in chapter 2.1 Literature on BPM and process modelling is given below in more detail.

11.5.1 Requirements elicitation

Requirements elicitation is included in phases 1 to 4 of the BPM implementation framework (Jeston & Nelis, 2006).

11.5.1.1 Strategy

Organisation strategy steps

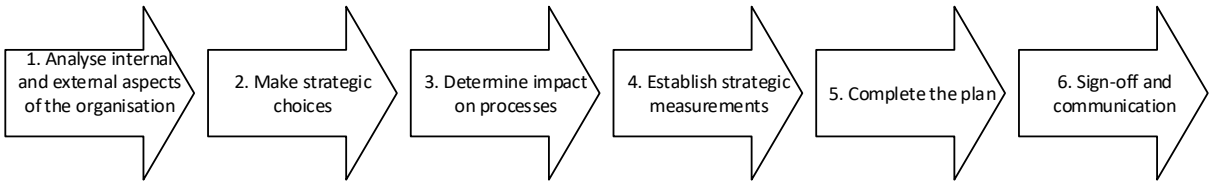


Figure 31: Organisation strategy (Jeston & Nelis, 2006, p. 69)

Since the project organisation does not have an organisational strategy documented, the following steps are discussed comprehensively.

1. Analyse internal and external aspects of the organisation

This step is to understand the organisation's internal and external strengths, weaknesses, competencies and constraints. Models typically used for this step are:

1. SWOT analysis (Porter, 2004b)
2. Core competencies (Godbout, 2000)
3. Competitive Forces (Porter, 2004b)
4. Environmental Aspects (Porter, 2004b)

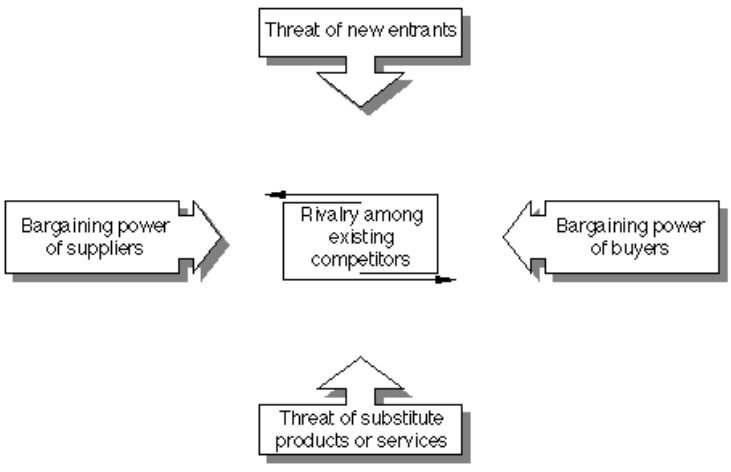


Figure 32: Porter's five strategic forces (Porter, 2004b)

2. Make strategic choices

Ask questions for a clear view on vision, mission, goals, strategic intent, objectives and implementation strategy. Models typically used are:

- Strategic options: Customer intimacy, operational excellence, product leadership
- Strategy maps using Balanced Score Card approach (Kaplan & Norton, 1996a)

3. Determine impact on processes

Impact on processes are determined by models created in steps one and two. The impact on processes is analysed against:

- Strategic Choice
- Core competencies
- Competitive forces
- SWOT analysis
- Performance prism

4. Establish strategic measurements

High-level measures are developed to measure progress of strategy execution, specific objectives for middle management and contribution to strategic goals. The Balanced Score Card method is a way to align processes with high-level organisational objectives.

5. Complete the plan

The strategic plan is developed in this phase and contains the overall organisation objectives and the general principles containing strategic choices derived from the organisation vision and strategy.

6. Sign-off and communication

The last step is a formal review of the results in previous steps by higher management. Once completed, it should not be changed, since the scope would also change. After the sign-off, the findings should be discussed with all stakeholders to ensure that they are informed and motivated throughout the project.

11.5.1.2 Process architecture

Process architecture steps

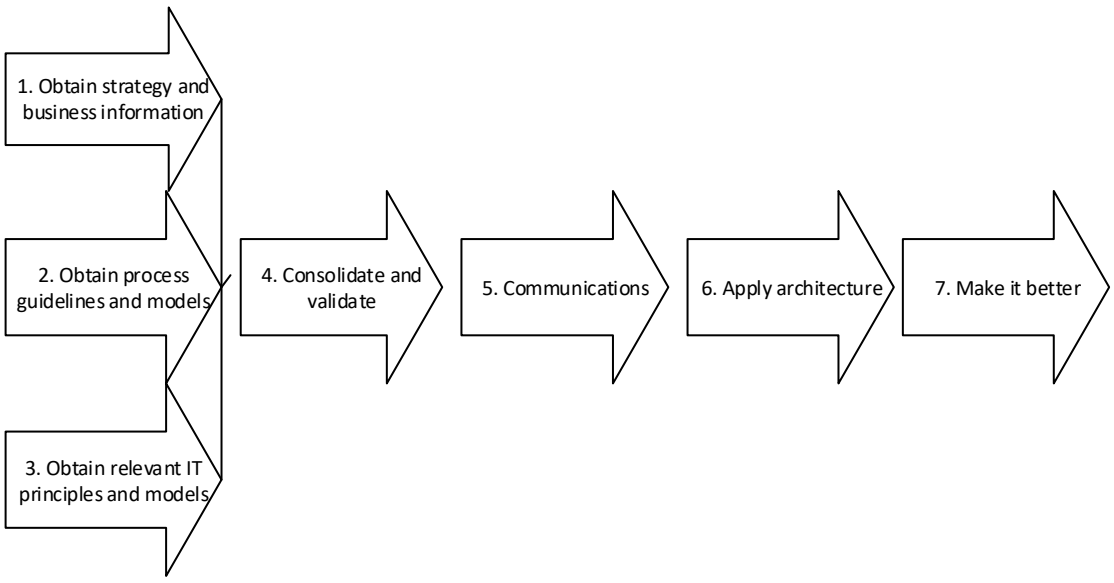


Figure 33: Process architecture steps (Jeston & Nelis, 2006, p. 87)

1. Obtain strategy and business information
   - Overall objectives and general principles as created in phase one.
   - Relevant products and services guidelines and models
   - Relevant organisation guidelines and models
2. Obtain process guidelines and models

- Process guidelines: Process ownership, scope, modelling method, management tools, governance, outsourcing and reference models.
- Process Models: Graphic representations of strategic, core and support processes.
- List of end-to-end processes: Develop end-to-end process models and capture metrics.

3. Obtain relevant IT principles and models

The undelaying principles and logic of the following need to be acquired.

- Data models
- Main applications and interfaces
- Main middleware
- Main platforms
- Main networks

4. Consolidate and validate

This step is where all the obtained information is validated to ensure consistency. As it can be complex the organisational relationship map is a tool used to amend any inconsistencies.

5. Communications

As the process architecture should form the base of projects and decision making, it is important that it is understood and used by all relevant stakeholders. Communicating the architecture through posters and diagrams will help people understand it and use it in their decision making.

6. Apply architecture

The organisation should develop the discipline to use the architecture as basis for decision making and projects. When there is deviation from it, the short- and long-term effects should be specified, how it will eventually be in line with the architecture and formal approval should be received on management level.

7. Make it better

It is customary practice that the full architecture is not completed at first attempt. This said, it is important to keep improving and updating the architecture to keep its relevance. It can be continually expanded in breadth, in depth and in volume.

11.5.1.3 Launch pad phase

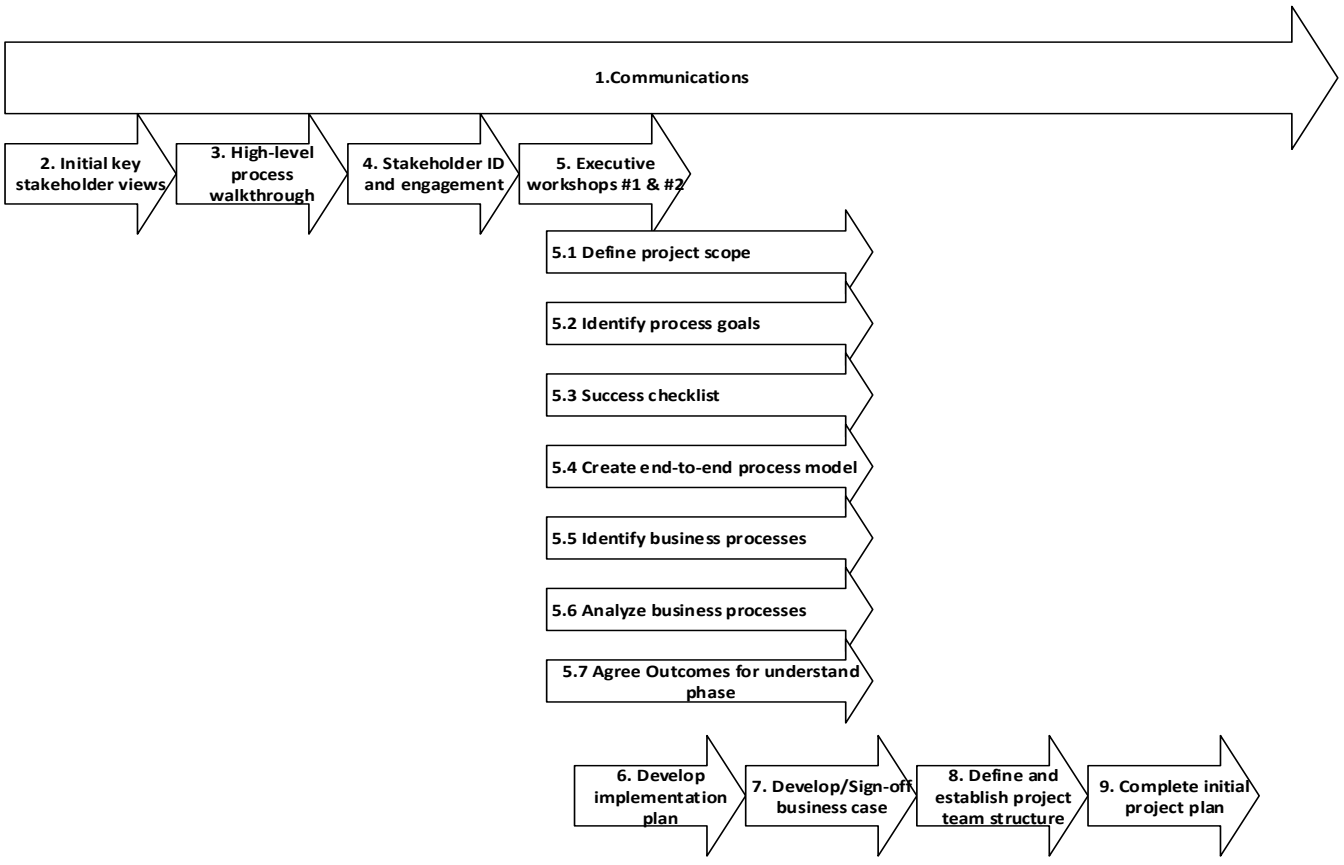


Figure 34: Launch pad phase steps (Jeston & Nelis, 2006, p. 103)

1. Communications

Communication with regards to the project is very important before the start of the project, throughout the project and even at the end of the project. Communications to personnel should contain what the impact of the BPM will be on them, what they can expect from management and how often details of opportunities will be shared.

2. Initial key stakeholder views

In this step, the views of the key stakeholders are obtained to get an overview of the business process environment and what the main operational issues are.

3. High-level process walkthrough

This is especially important in an environment where the project team is not familiar with the organisation and a few days are spent with executors to understand end-to-end processes. Time should also be spent to establish the role of IT systems supporting these processes. This step is later done in more detail during the understand phase.

4. Stakeholder identification and engagement

Stakeholders along with their involvement should be established. There will for example be stakeholders who need continued updates and may even participate, where others only need to get occasional updated. Stakeholders may be internal and external and a stakeholder analysis could typically be done by means of a stakeholder grid(Steyn, Dekker, Kuschke, Van Eck, & Visser, 2016).

5. Executive workshops

This is a critical step as the project progress will continuously be compared with the results of the steps in 5.1 to 5.7.

5.1. Define project scope

5.2. Identify process goals

5.3. Success checklist

5.4. List of end-to-end processes

5.5. Identify business processes

5.6. Analyse business processes

5.7. Agree outcomes for Understand phase

6. Develop implementation plan

Although it may require an additional early investment, it is critical to already plan for implementation during the launch pad phase. This is because an implementation that is not completed smoothly will affect the results of the solution. It may cause the solution to not perform optimally, the users cannot use the system or the time frame for implementation is extended.

7. Develop/Sign-off business case

A standard business case template should be used including an Economic Value Add (EVA) analysis, internal proposal preparation, documentation covering operational costs that are non-quantifiable, pros and cons of different options and use performance evaluation criteria.

8. Define and establish project team structure

Relevant stakeholders should be identified as being part of the project steering committee, decision team, process architecture team, process team and management team. As part of the project steering committee, a project director and project manager should be chosen.

9. Complete initial project plan

This step must include the Understand and Innovate phases but should not be constrained to time frames yet. Identification of potential benefits takes place here as part of realizing value.

11.5.1.4 Understand phase

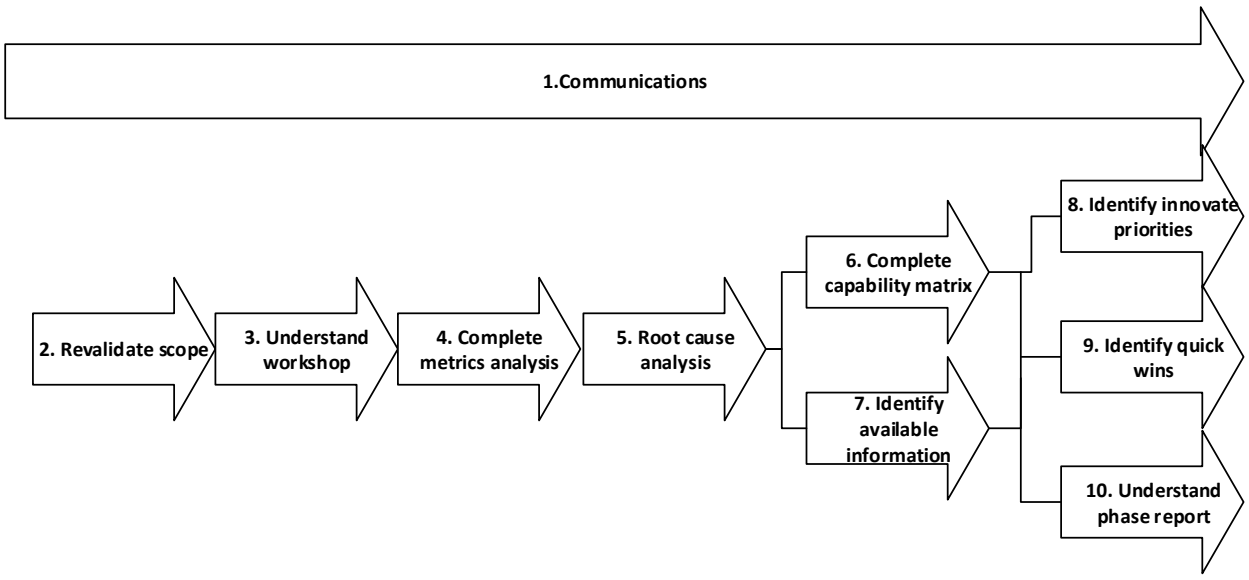


Figure 35: Understand phase steps (Jeston & Nelis, 2006, p. 127)

1. Communications

Communication should take place with all stakeholders throughout the organisation during the whole Understand phase to keep everyone updated on the objectives and progress of the project.

2. Revalidate scope

The scope should be re-evaluated throughout the scope of the project to ensure that there is no duplication or unnecessary work done, all end-to-end processes are clearly understood and to make sure processes are fully integrated.

3. Understand workshop

This step is especially important as processes do not always happen like management think it does and to evaluate whether improvement is necessary and possible. It is where facts are gathered to document and understand process interactions and interfaces with systems and people.

4. Complete metrics analysis

Gather metrics and prioritise to use for baseline in comparative activities when measuring the impacts on the processes. Metrics should be gathered using workshops, questionnaires, interviews and management reports.

5. Root cause analysis

Before starting the innovate phase, the root cause of an underperforming process should be identified. Root-cause analysis can be done using the 5 why's-method or fishbone diagrams (Jayswal, Li, Zanwar, Lou, & Huang, 2011).

6. Complete capability matrix

The capability matrix (Jeston & Nelis, 2006, p. 137) is based on the capabilities or skills required for each identified key process.

7. Identify available information

A matrix should be developed (Jeston & Nelis, 2006, p. 138) to recognise the knowledge available or desirable for each of the key processes, for example manuals and business rules.

8. Identify innovate priorities

During the metrics gathering and root-cause analysis steps, improvement opportunities should arise. These opportunities should be evaluated and prioritised according to metrics. It could be good enough initial, slightly or greatly altered, redesigned completely, outsourced or insourced or eliminated.

9. Identify quick wins

Try to identify easy and quick alterations that make an impact to motivate stakeholders and to provide some funding.

10. Understand phase report

At the end of the phase a report with the phase outcomes should be delivered to the project sponsor. The report should contain: the purpose for the phase, process issues found during workshop analysis, stakeholder list with their roles, findings and a suggested Innovate phase prioritisation.

11.5.2 Evaluation of alternatives

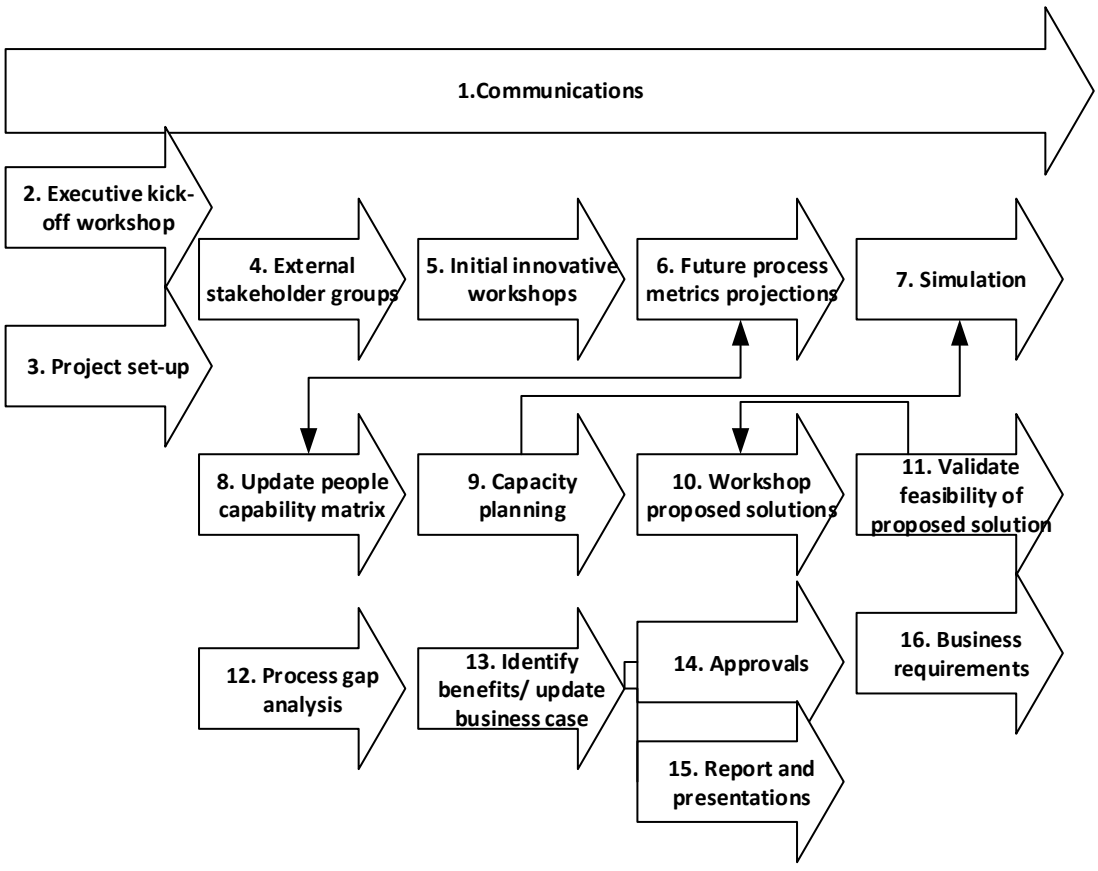


Figure 36: Innovate phase steps (Jeston & Nelis, 2006, p. 149)

1. Communications

Communicate with stakeholders especially on their input in the innovate phase. If suggestions cannot be used, be sure to explain why.

2. Executive kick-off workshop

During this step, key stakeholders should be informed about timeframes, process goals, possible automation, a success checklist and the outcomes as the way forward.

3. Project set-up

In this step, a quick review is done of the initial project plan to confirm that all plans still conform to above stated requirements.

4. External stakeholder focus groups

A high-level discussion with external stakeholders take place during this step, to inform them of the initial plans and to get input on their experience of problems for the process.

5. Initial innovative workshops

After analysis of the Understand phase, the creative phase follows with innovative ideas depending on outcomes set. Ideas should be taken from internal and external stakeholders and care should be given in limited thinking. Triggers could be used to empower employees for decision making.

6. Future process metrics projections

Once the new processes have been modeled during the innovative workshops, additional benefits and opportunities should be identified. The potential operational cost should also be considered here and validated using the business case. This is done by considering the resources used by the process, other business inputs and ongoing projected IT costs.

7. Simulation

Simulation is a means of testing the proposed solution without having to implement it. The results of the simulation runs are used to measure performance of the processes.

8. Update people capability matrix

The people capability matrix created during the Understand phase should be updated for the new process.

9. Capacity planning

Capacity planning is used to ensure that the organisation can meet its goals with the people available, considering the capabilities of people.

10. Workshop proposed solutions

The proposed solutions should be narrowed down to a smaller number and all the stakeholders should be gathered to make sure it adheres to all their needs.

11. Demonstrate and validate feasibility of proposed solution

Further analysis is done in this step to ensure that relevant IT systems will be compatible with the new process and that the business can function effectively with the new process.

12. Process gap analysis

This step creates a comparison between the Understand and Innovate phases to plan on differences regarding areas like training, infrastructure, IT systems and health and safety.

13. Identify benefits and update business case

The business case that was created during the launch pad phase has estimated benefits to be updated during the Innovate phase. After this phase, the business case should be much more comprehensive than in the launch pad phase.

14. Approvals

Reports and presentations are given to the organisation to approve before implementation.

15. Report and presentations

Results are presented in presentations and reports to senior management and executives in an opportunity to promote the project for approval.

16. Business requirements

Business requirements are later used for the Develop phase and is supporting documentation for process models.

11.6 Appendix F: Quotation time study

Table 42: Manual assign to quotation time study

Quote	Hours between	Quote	Hours Between
1	0:10	41	2:52
2	0:14	42	2:58
3	0:17	43	2:59
4	0:20	44	3:10
5	0:21	45	3:11
6	0:22	46	3:18
7	0:23	47	3:29
8	0:24	48	3:34
9	0:25	49	3:34
10	0:28	50	3:56
11	0:28	51	4:00
12	0:38	52	4:00
13	0:41	53	4:08
14	0:46	54	4:28
15	0:53	55	4:30
16	1:01	56	4:38
17	1:02	57	4:41
18	1:04	58	4:42
19	1:07	59	4:52
20	1:09	60	5:16
21	1:11	61	5:25
22	1:15	62	5:53
23	1:15	63	6:00
24	1:20	64	6:00
25	1:23	65	6:30
26	1:32	66	7:43
27	1:40	67	11:14
28	1:47	68	4:57
29	1:54	69	1:28

Table 43: Semi-automated request to quotation response time

Quote	Response time	Quote	Response time
1	3:10	21	0:12
2	0:52	22	1:29
3	0:45	23	0:11
4	0:47	24	0:30
5	1:26	25	5:28
6	0:17	26	1:01
7	0:23	27	2:46
8	2:55	28	0:49
9	0:26	29	3:10
10	2:25	30	0:16
11	1:26	31	1:48
12	3:10	32	2:37
13	2:20	33	3:02
14	0:29	34	0:24
15	5:02	35	7:20
16	1:00	36	2:42
17	0:54	37	0:20
18	2:54	38	0:24
19	1:50	39	3:27
20	1:30	40	0:21

11.7 Appendix G: ERD

ERD's are first given for the initially separate diary system and website, followed by an integrated ERD of the expanded IS.

11.7.1 Website ERD extract

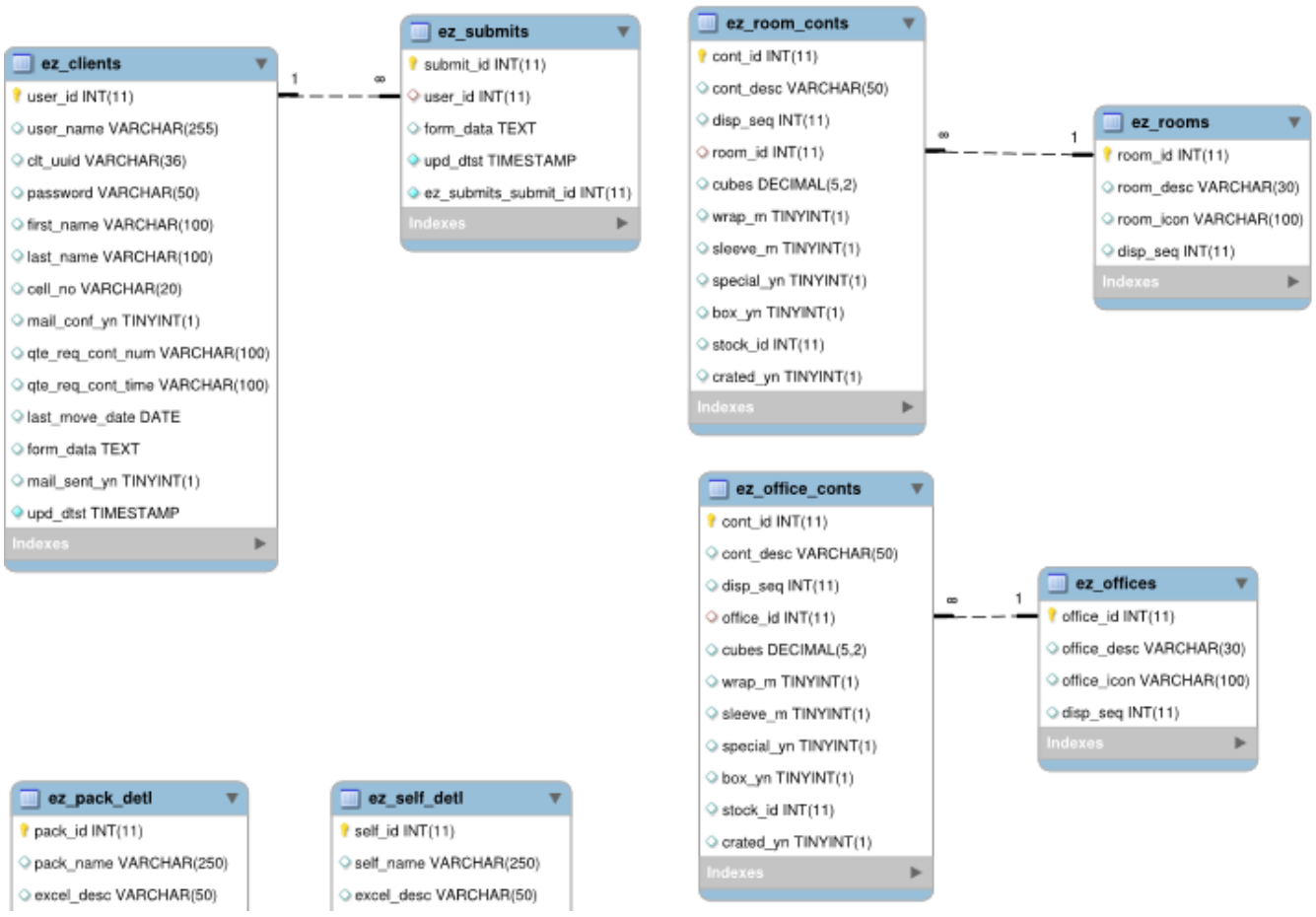


Figure 37: Entities in website

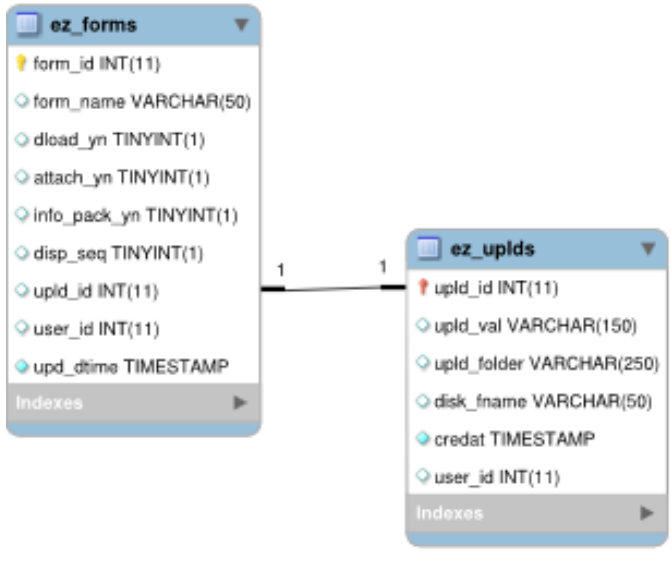


Figure 38: Entities in website

Above entities to be used in only the website and are used in the quotation extension of IS.

11.7.2 Diary ERD extract

Figure 39: Entities in IS

Extract of the initial diary IS ERD that is later integrated with the entities from the website.

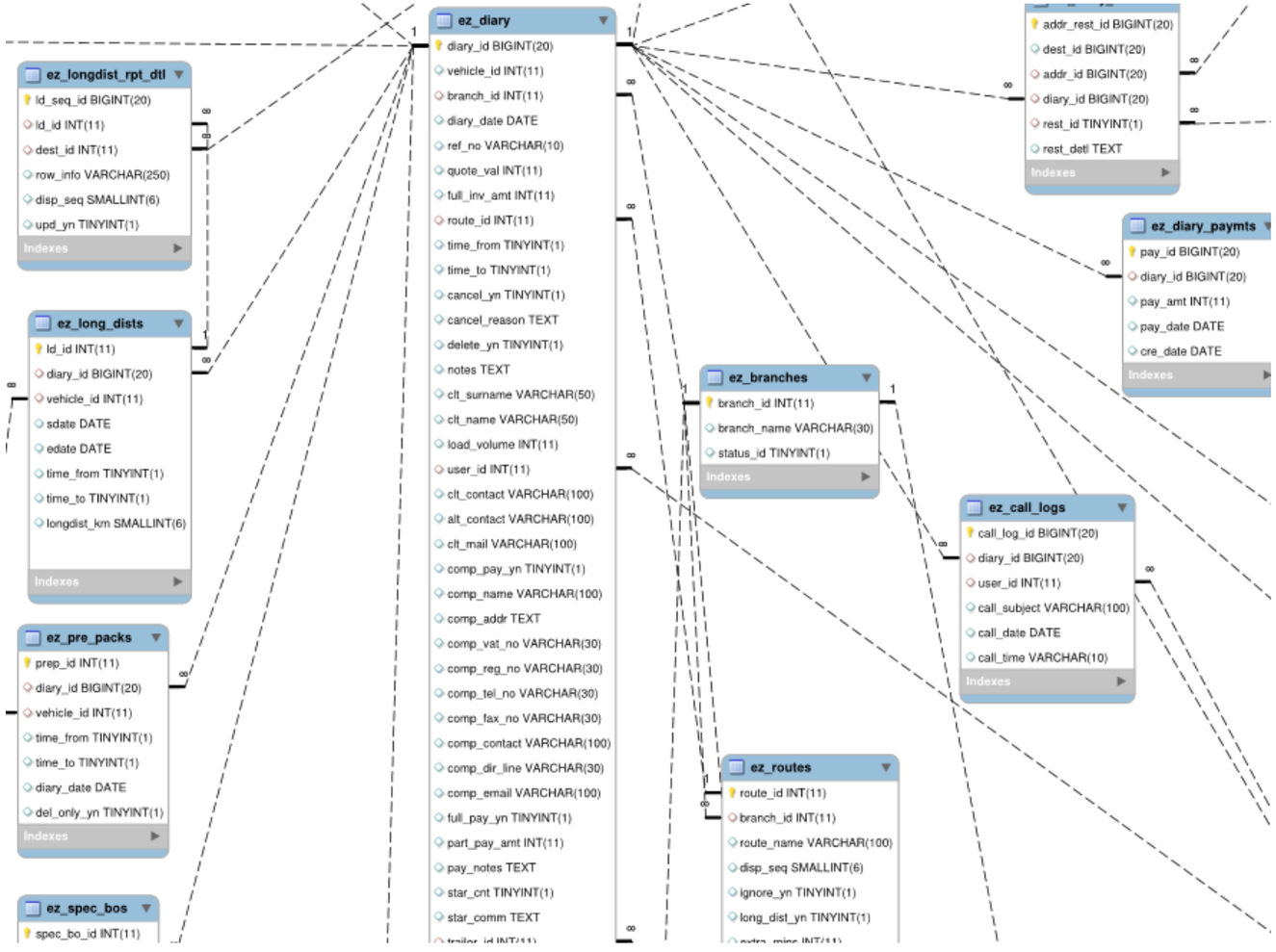


Figure 40: Initial diary IS extract

11.7.3 Complete system ERD

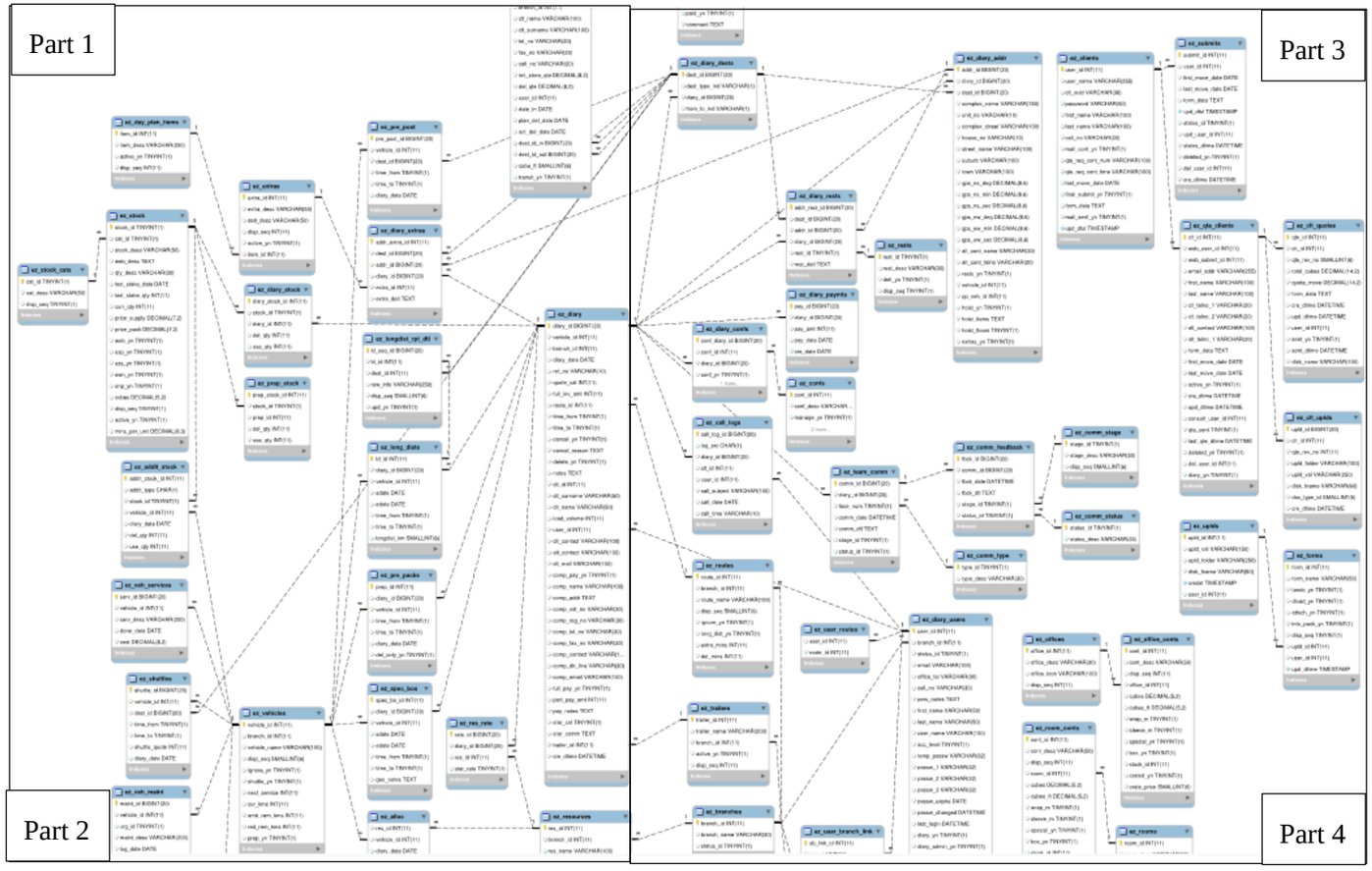


Figure 41: Complete system ERD

The above figure shows the ERD for the expanded IS. To clarify, the following parts 1 to 4 will capture the ERD in greater detail.

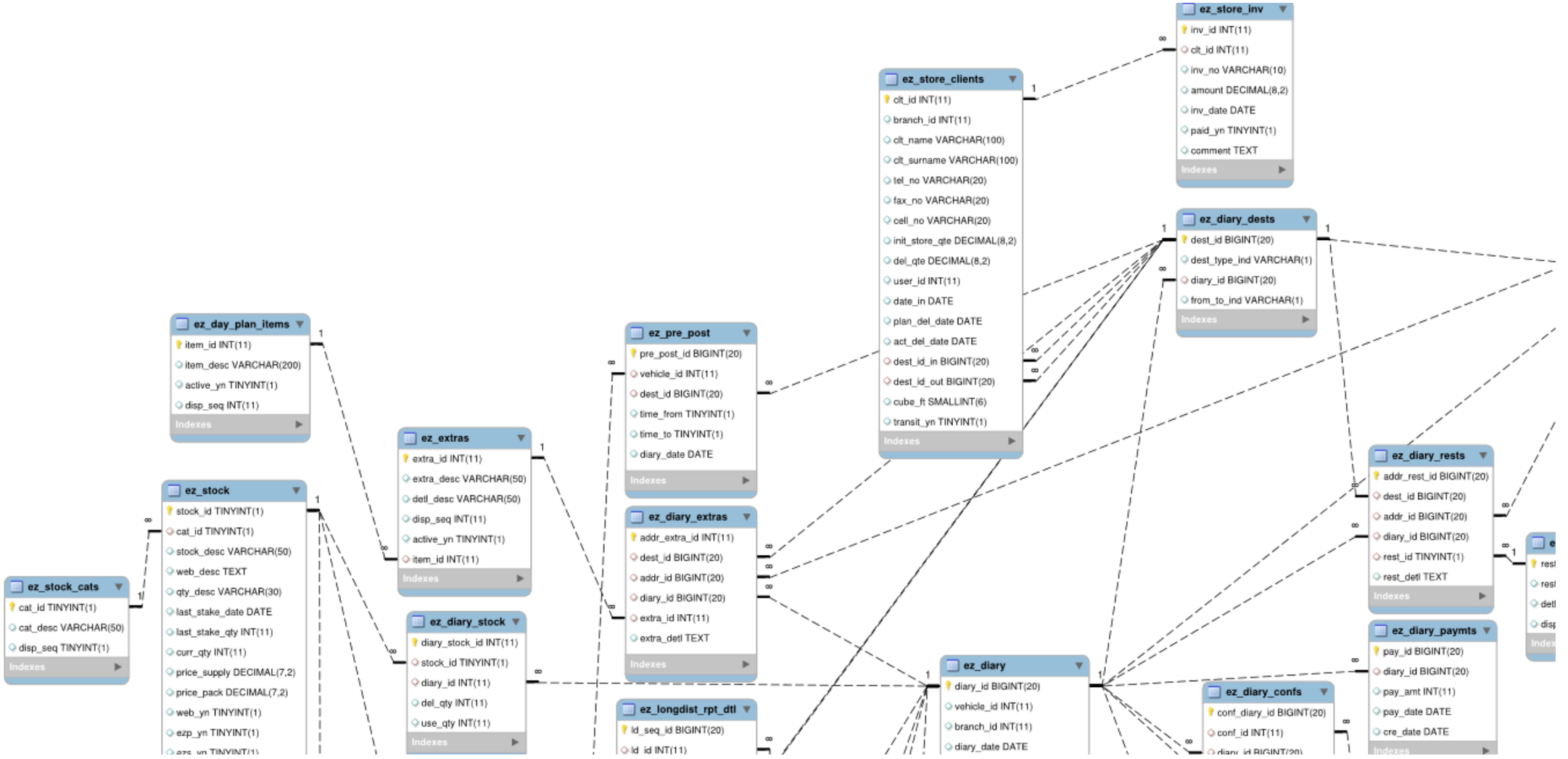


Figure 42: Complete system ERD part 1

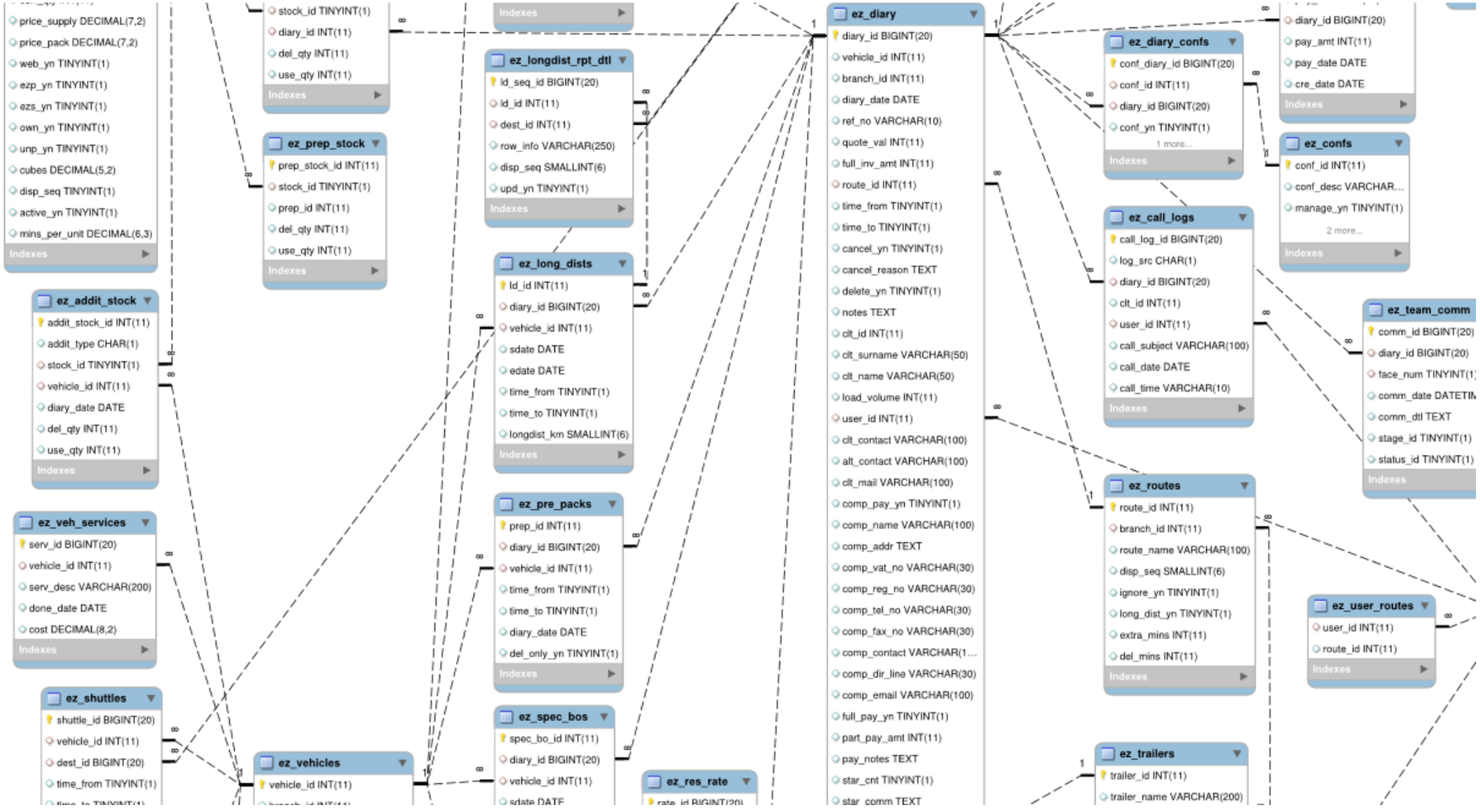


Figure 43: Complete system ERD part 2

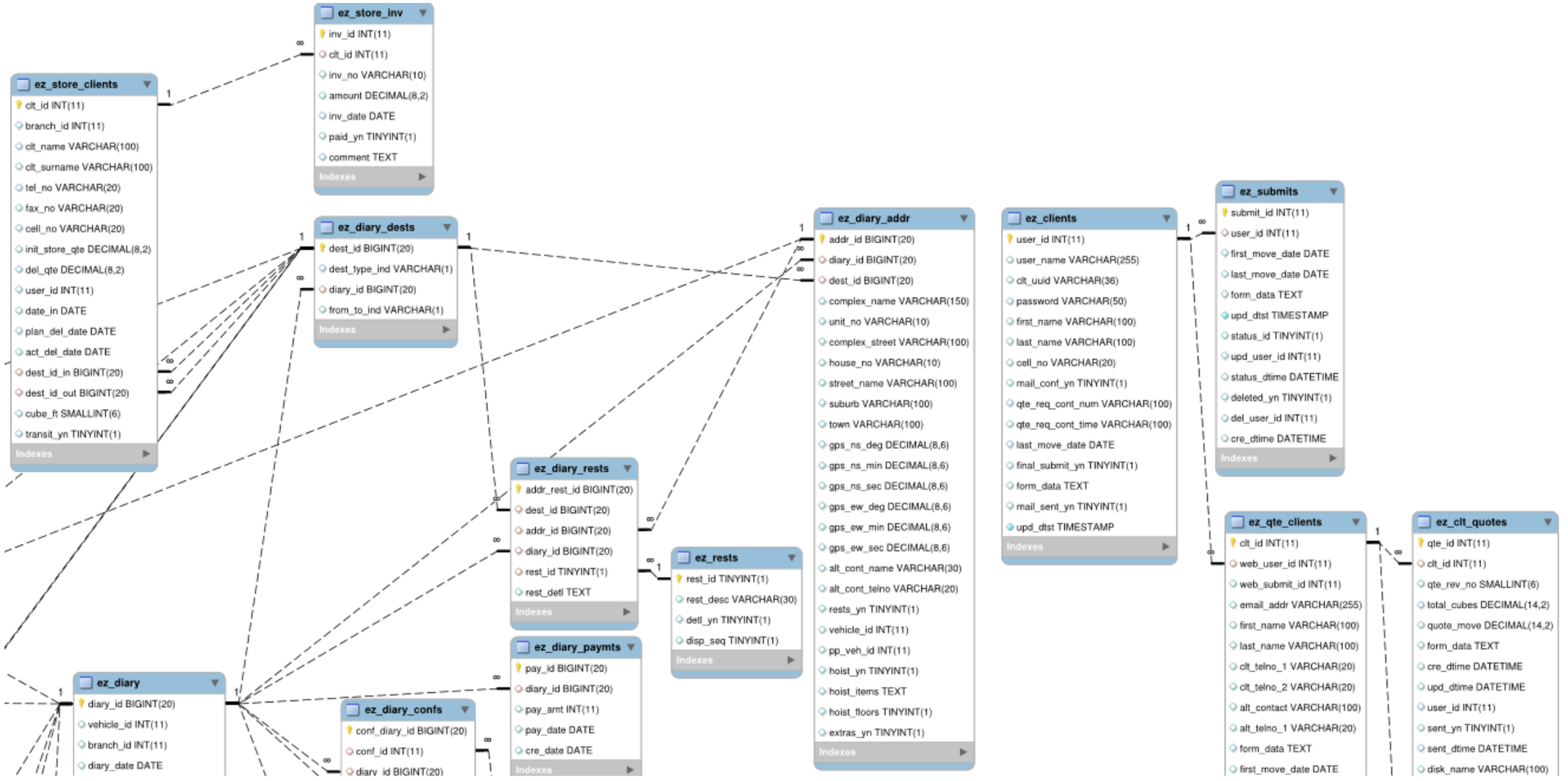


Figure 44: Complete system ERD part 3

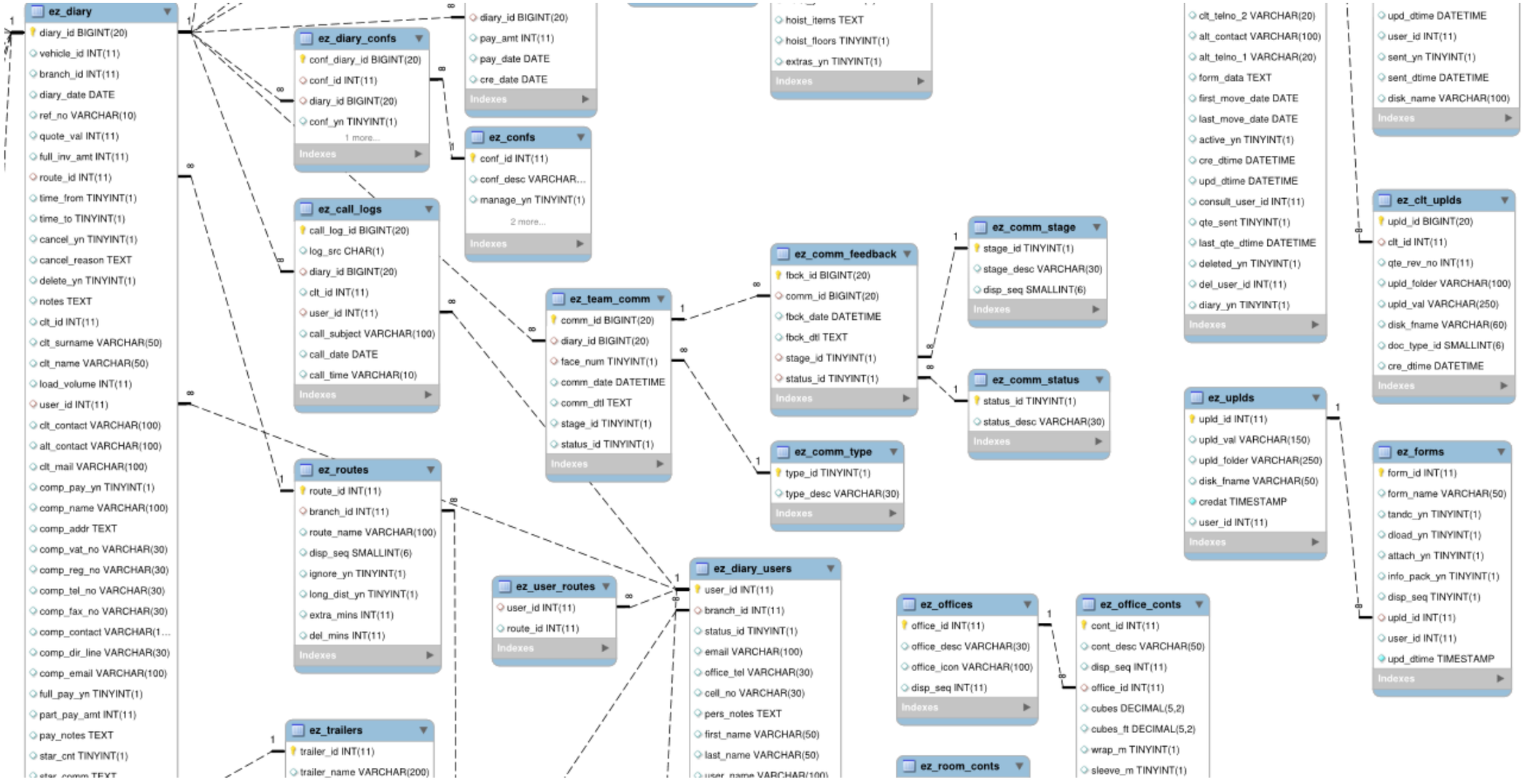


Figure 45: Complete system ERD part 4

11.8 Appendix H: Initial process models

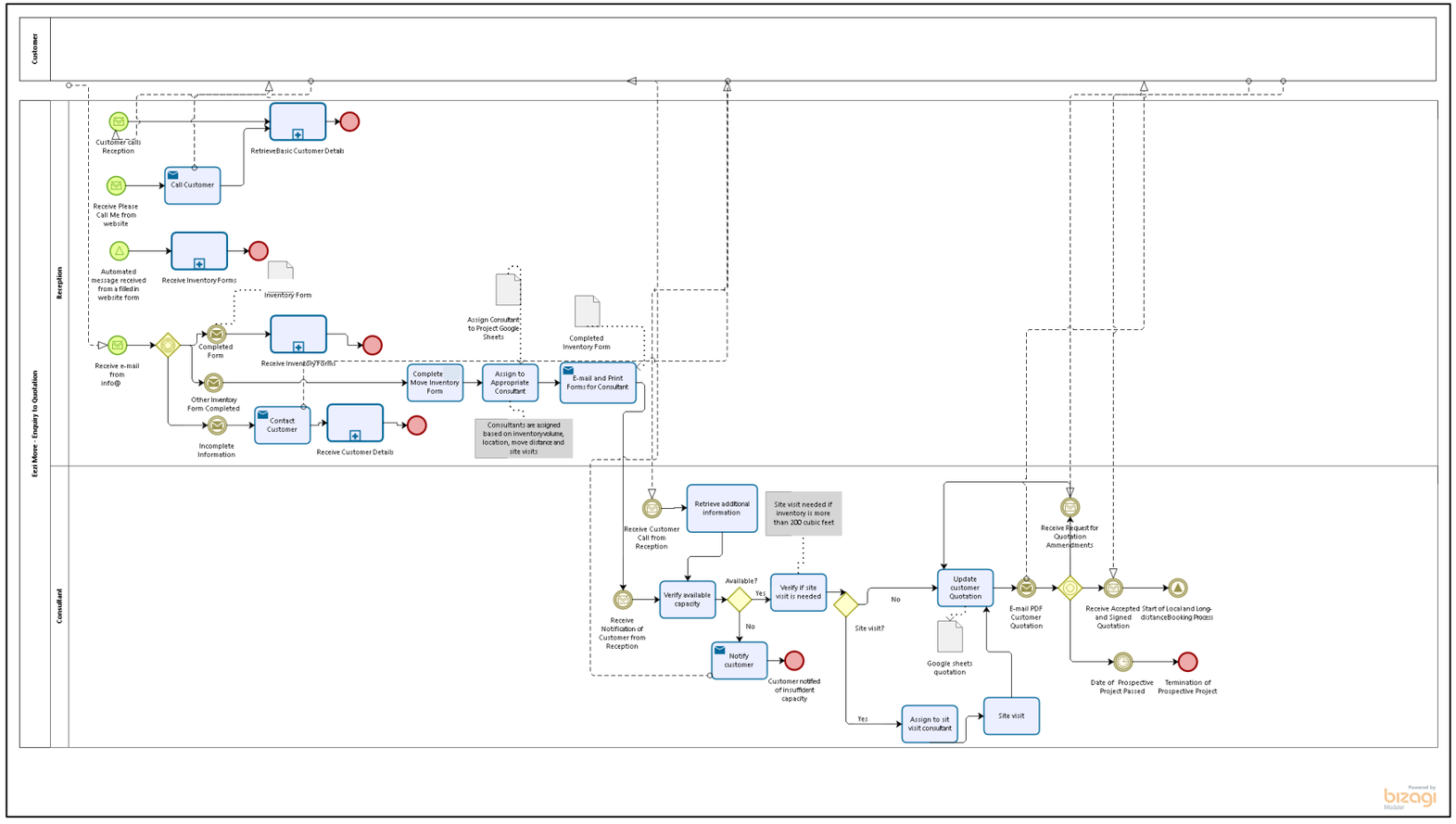


Figure 46: Enquiry to quotation full process

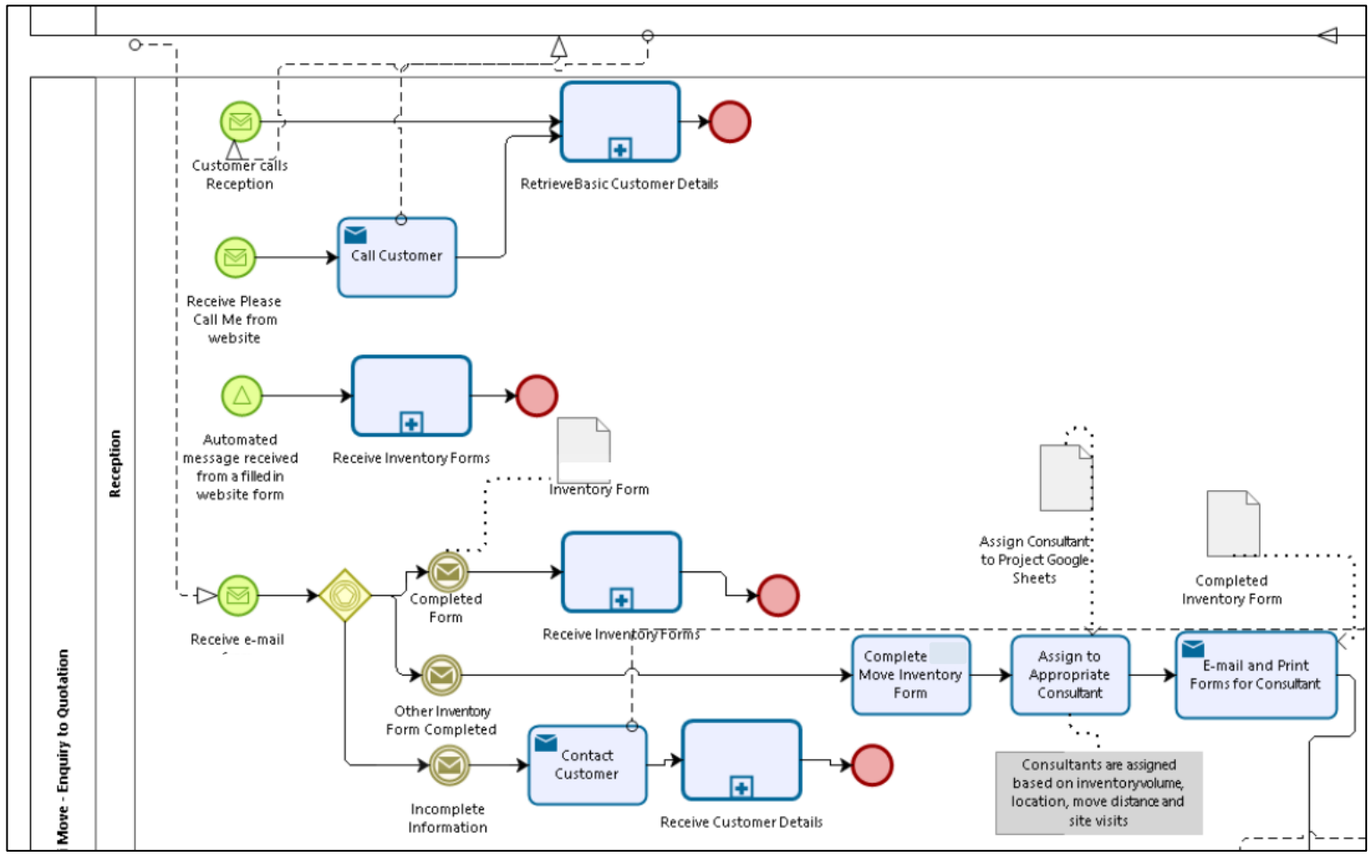


Figure 47: Enquiry to quotation part 1- Reception

The enquiry to quotation is also described in the use-case narratives in section 5.2.2.1. The customer enquiries come from telephone calls, e-mails or website quote requests. Phone calls are received by reception and when reception identifies the caller as an initial customer, reception puts the call

through to the appropriate consultant. If it is a potential customer, reception gathers the necessary detail to be able to assign the potential customer to an appropriate consultant to receive a quotation.

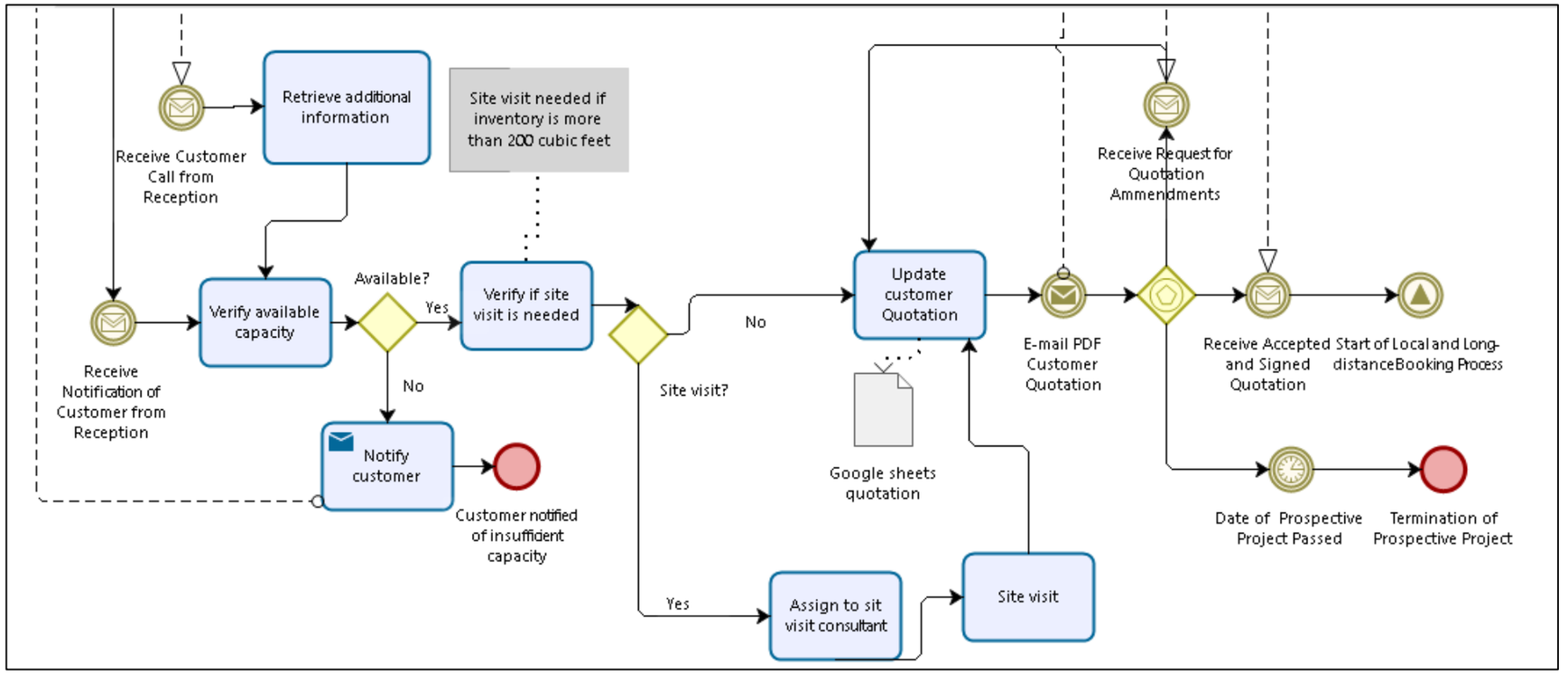


Figure 48: Enquiry to quotation part 2- Consultant

The above figure shows the process from the time reception assigns the customer to a consultant until the time a consultant receives an accepted quote. Assigning of a customer is done, based on moving addresses and volumes. For volumes greater than 2 000 cubic feet, the site visit consultant is used. A quotation is sent to the customer directly from the e-mail and will for local moves be accepted up until the day before the move, given that the

capacity is sufficient. Customers sometimes require consultants to change the quotation by adding or subtracting items from their inventory list before accepting a quotation.

Below sub-processes are found in Figure 47: Enquiry to quotation part 1- Reception and are executed by reception.

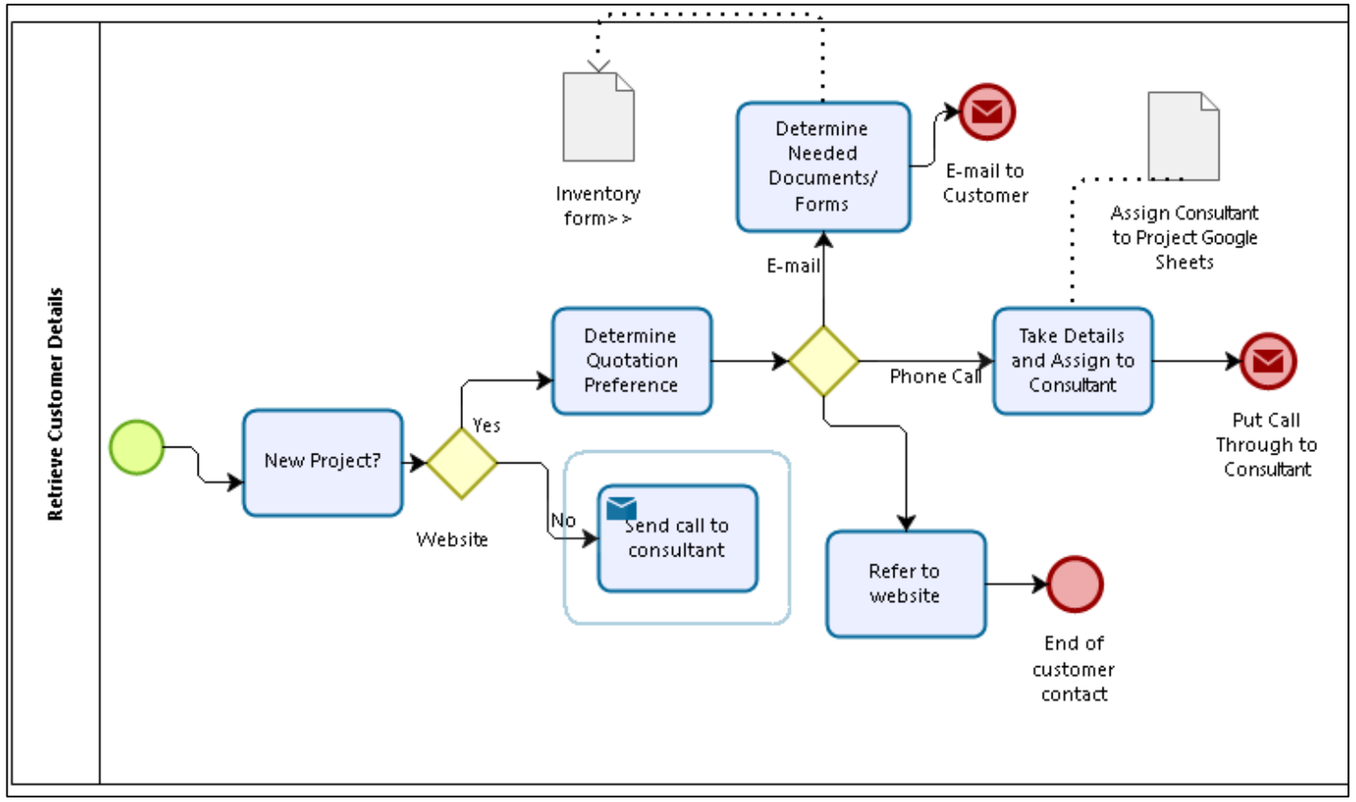


Figure 49: Retrieve customer details sub-process- Reception

When the customer is a potential customer with an enquiry for a quotation, reception will ask the customer their quotation preference. If the customer would like to fill in the manual inventory forms, reception sends the appropriate PDF inventory forms to the customer. These forms are then later received via e-mail and the subsequent process is described in Figure 47. If the customer prefers a telephonic quotation, reception takes the customer's basic information and assigns an appropriate consultant. Lastly reception may refer a customer to the company's interactive website where an inventory form can be completed online and automatically sent to reception.

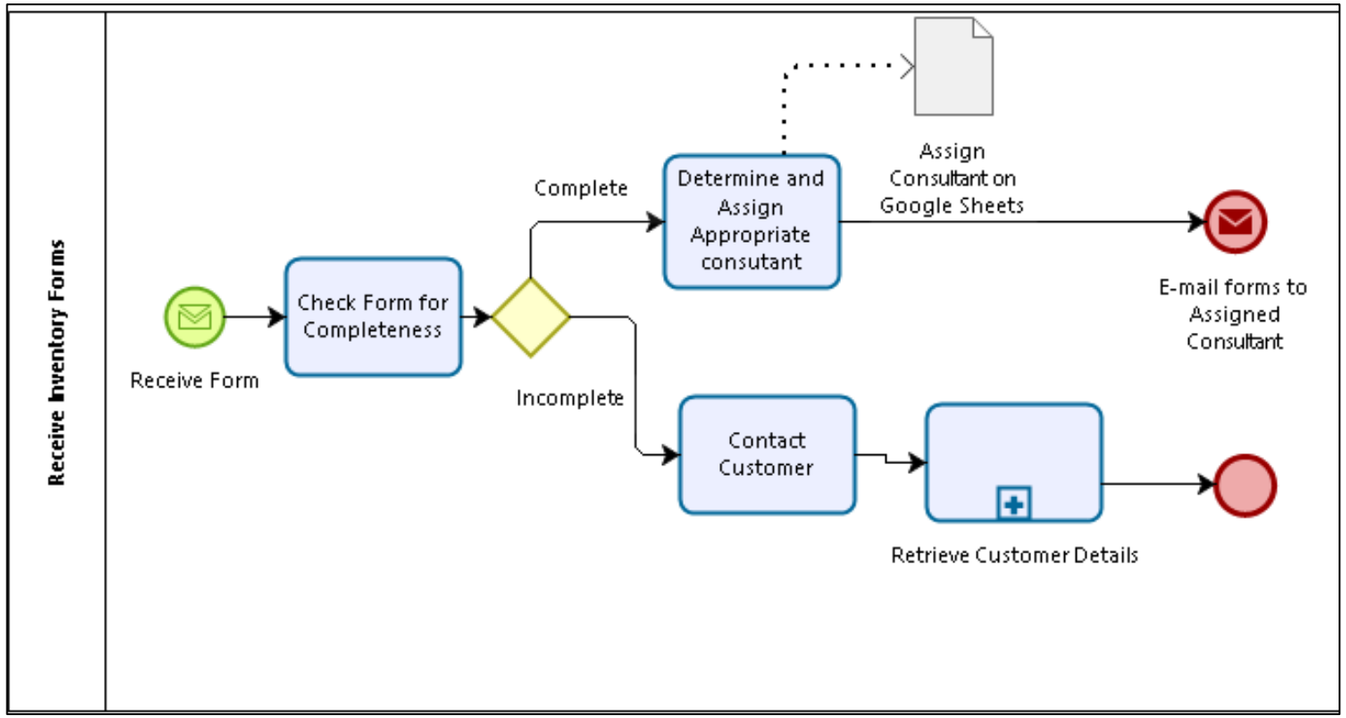


Figure 50: Receive inventory forms sub-process- Reception

The above sub-process also forms part of Figure 47. When an inventory form is received, reception checks it for completeness before assigning an appropriate consultant. If the form is not complete, reception will contact the customer and repeat the sub-process in Figure 49.

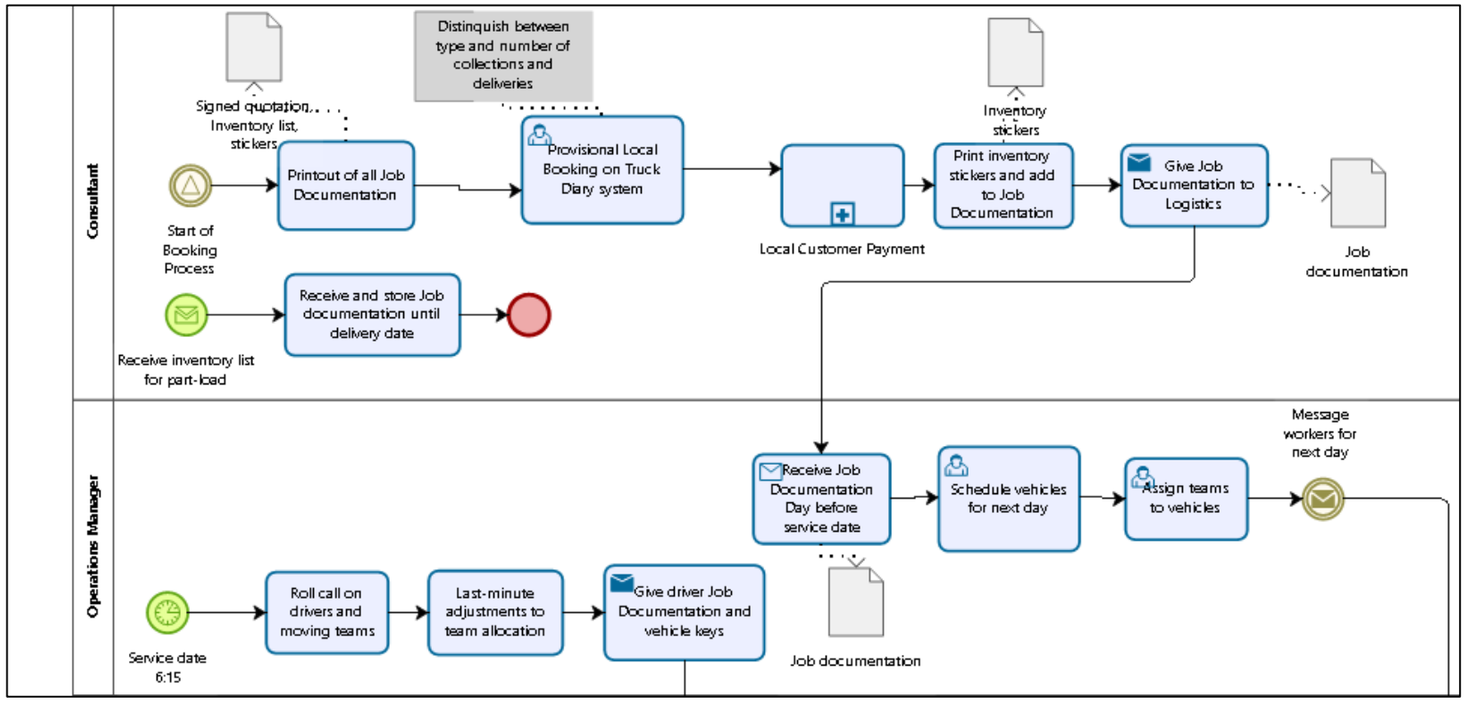


Figure 51: Booking to local service part 1

Services are divided into local and long-distance moves. Local moves are moves that typically stay within the same province and are handled differently to long-distance moves. For local moves, provisional bookings are done before receiving full payment. When consultants are finished with the paperwork of a move, it is all printed out and handed to logistics in hard copy. The paperwork for a job is referred to as job documentation and later given to vehicle drivers doing the move on the day of the move. Job scheduling happens on the day before the service date and the logistics manager

revises and sometimes reschedules vehicles and time slots to minimize transportation costs. Teams are also notified if they are required to work the next day.

On the service date, teams arrive for roll call and if there are any absentees, final adjustments are made before the vehicles leave the premises.

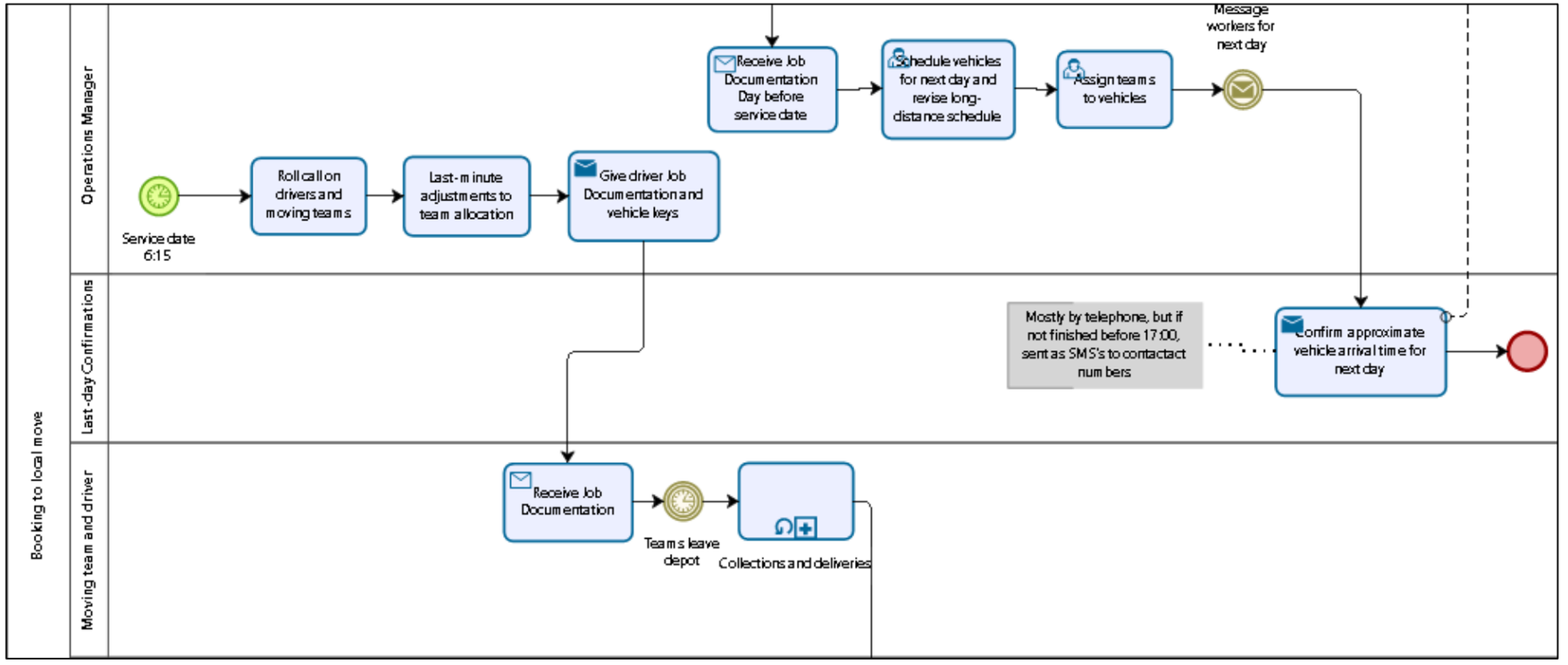


Figure 52: Booking to local service part 2

After the job scheduling is done by the operations manager, the consultant doing last-day confirmation is notified. The consultant confirms the expected arrival time with all customers being serviced the following day.

Before the vehicles leave the premises, job documentation is given to the driver of the vehicle, who is responsible to ensure that his team tend to all the services specified in the job documentation. After leaving the depot, the sub-process for collections and deliveries starts as shown in Figure 56.

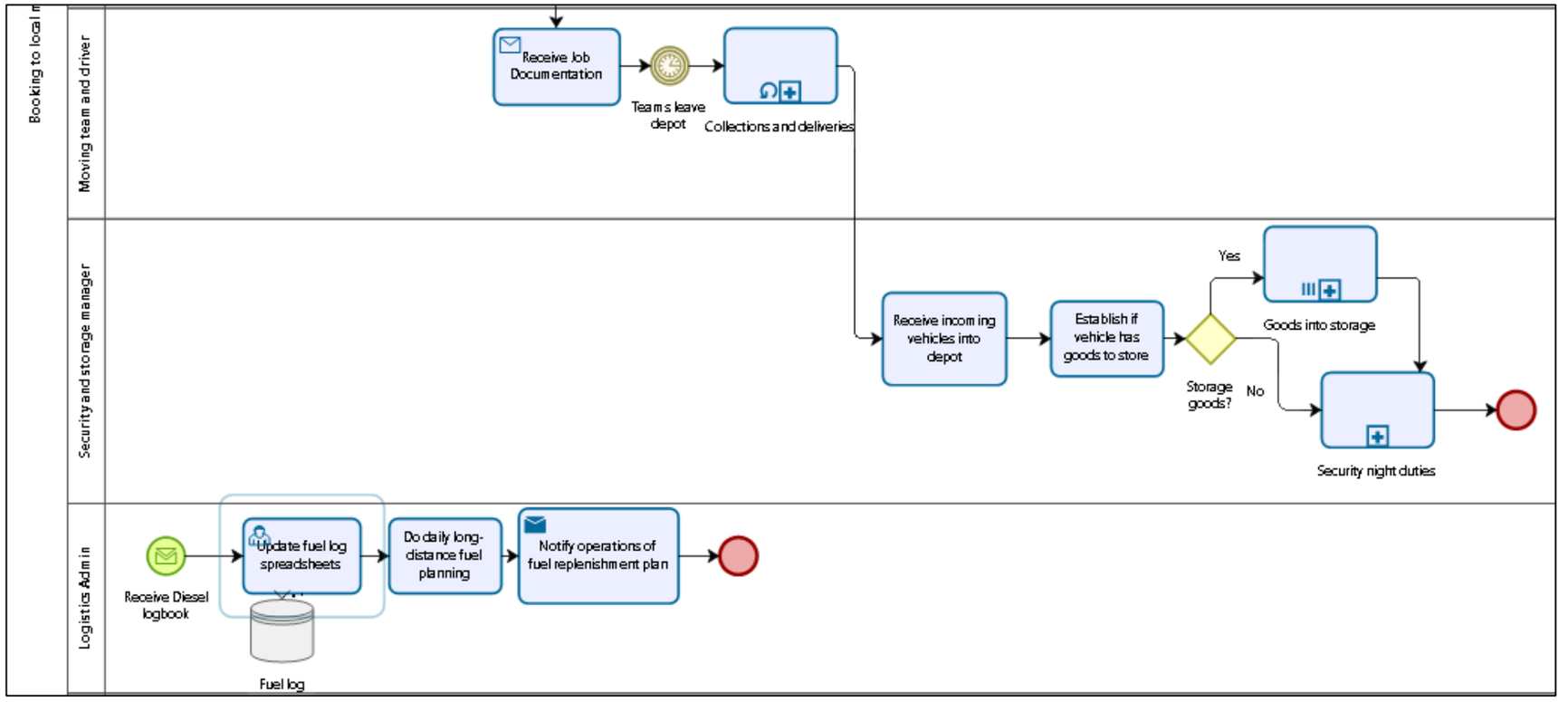


Figure 53: Booking to local service part3

When a vehicle is done with all the required deliveries and collections for the day, it returns to the depot. Here, the security and store manager receive the vehicle and establishes whether it has goods to store. If the vehicle has goods to store, the goods are received into storage. If there are no goods to store, security continues with his night duties.

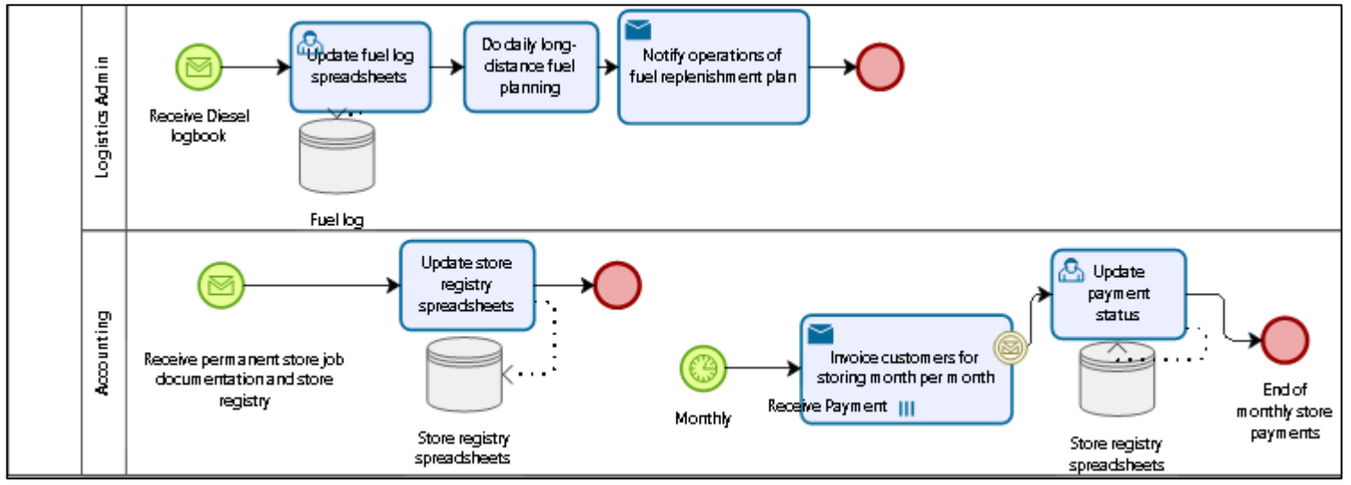


Figure 54: Booking to local service part 4

Logistics admin receives the fuel log sheets from security after the security night duties after filling all the vehicles on the premises and updates the fuel log spreadsheets.

Accounting receives the job documentation for storage and updates the storage registry. Every month, accounting sends the customers in permanent storage their monthly invoices.

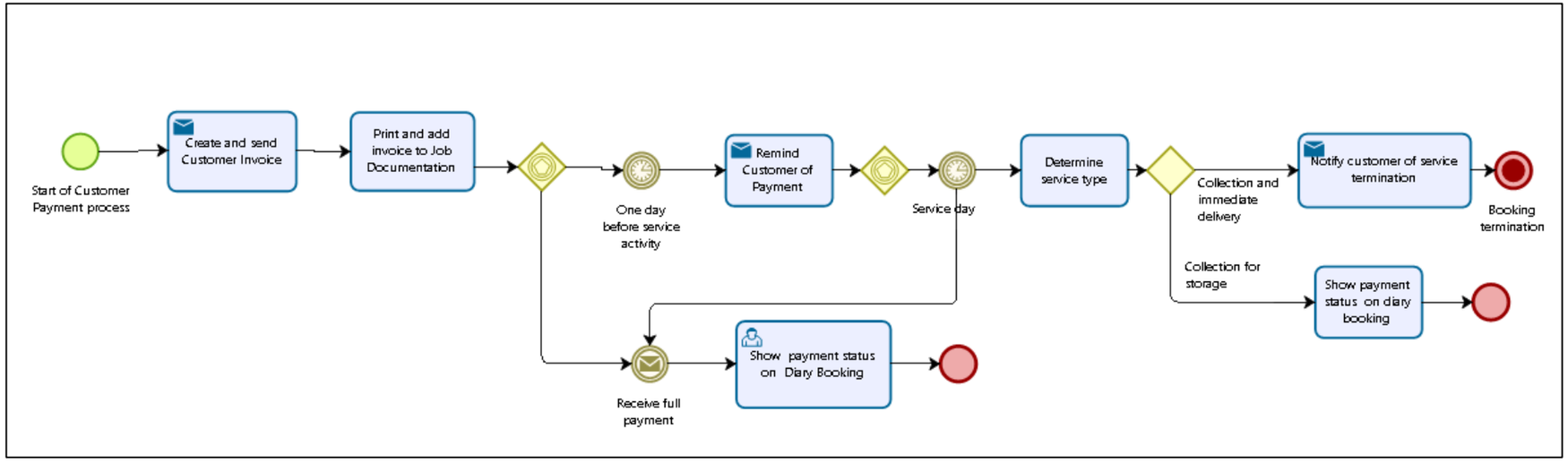


Figure 55: Local customer payment sub-process-Consultant

The payment for local customers is much more lenient than with long-distance customers. When the provisional booking is made, the consultant sends the invoice to the customer and waits for payment. When payment of proof or payment is received, the consultant will update the customer's status as "paid" on the IS. If the customer has not yet paid the day before the move, the consultant contacts the customer to remind of payment. If payment is not received before the delivery date of a job, the delivery is withheld.

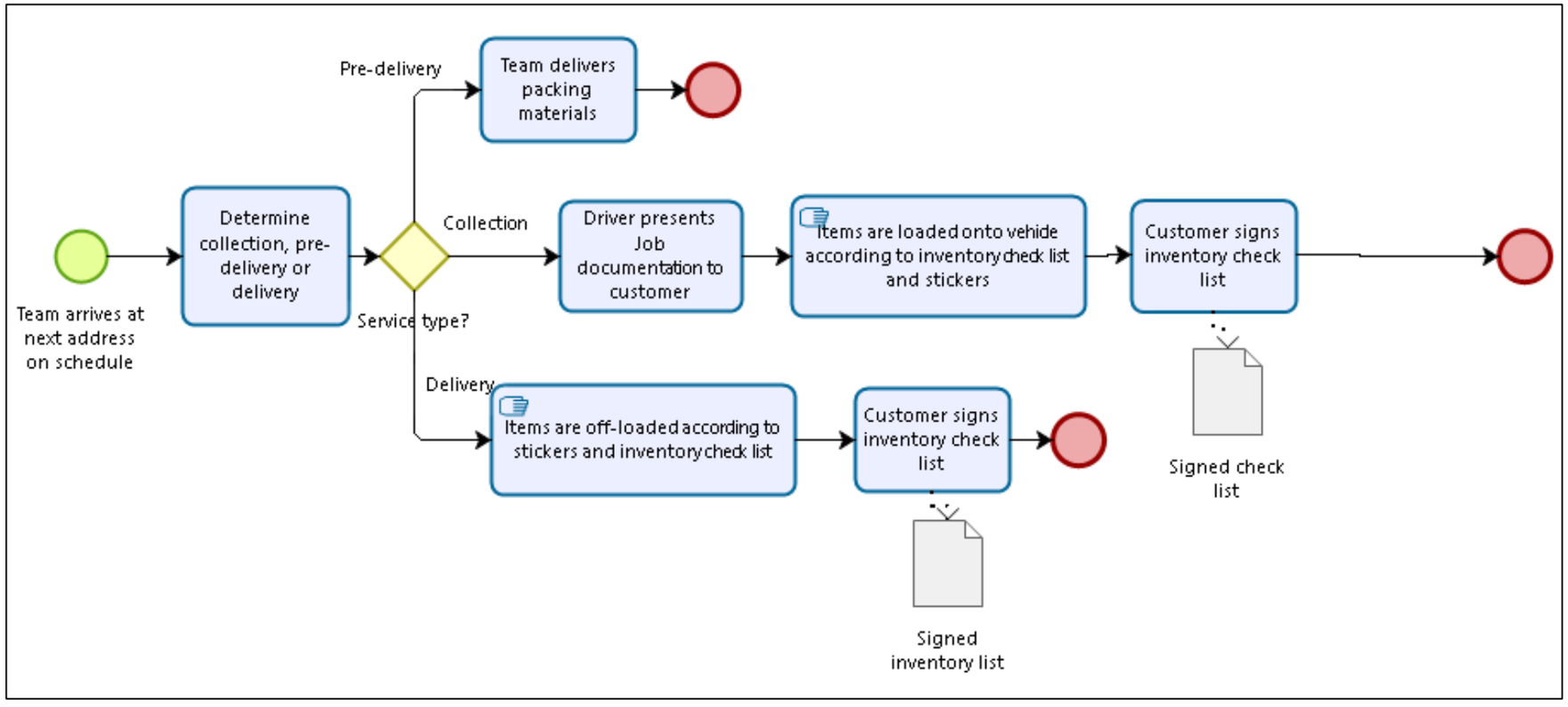


Figure 56: Deliveries and collections sub-process- Driver and moving team

Teams receive job documentation for all the deliveries and collections in a day. If the next job is a pre-delivery, only packing materials need to be delivered to the specified address. If it is a collection, the driver must present the job documentation to the customer and verify the details. The moving team then loads the cargo into the vehicle. After the customer signs the inventory list, the vehicle leaves for the next scheduled address.

If the next service is a delivery, items are offloaded and the customer again signs the inventory list.

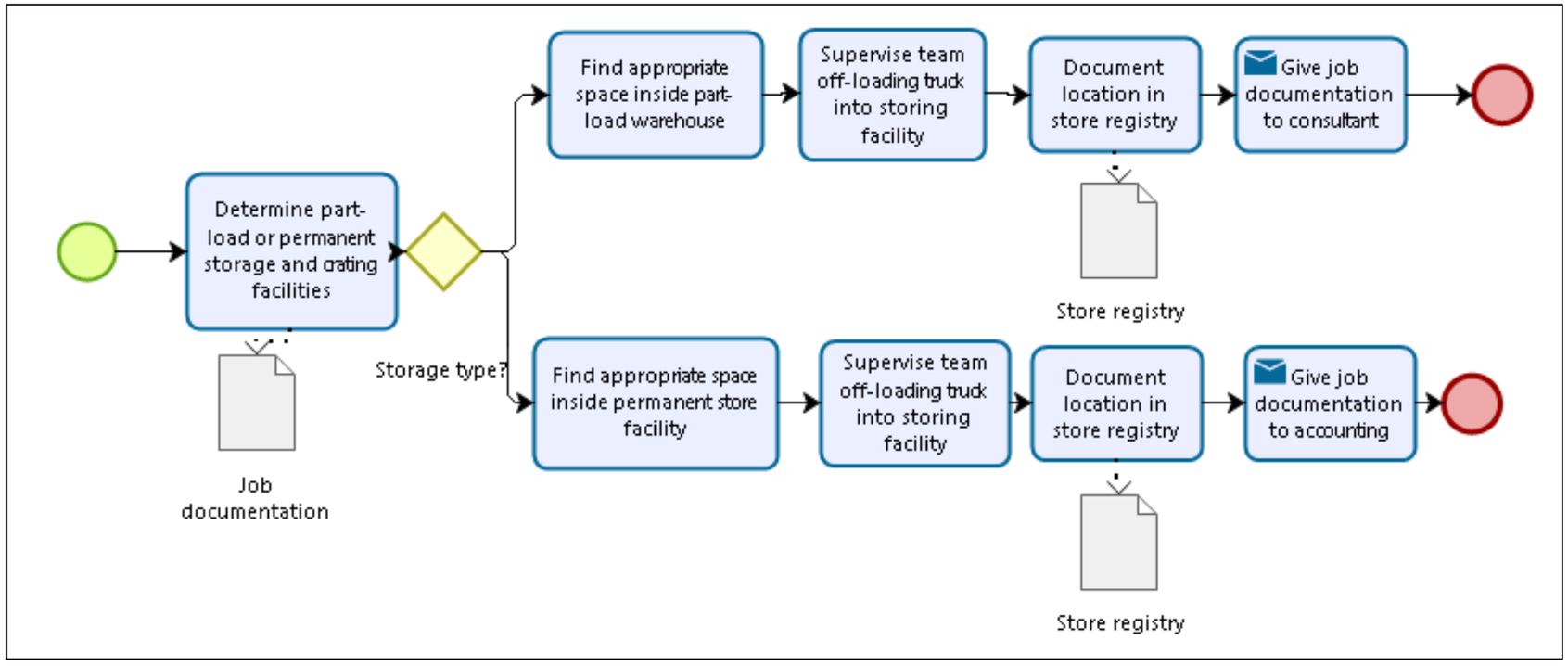


Figure 57: Goods into storage sub-process- Warehouse manager

When the warehouse manager must accept goods into storage, he first determines whether it is permanent or part-load, since different warehouses are used for different services. A part-load is a load that will temporarily be inside Company ABC's storage to wait for an opportunity on a long-distance vehicle. Permanent storage is storage that is booked into storage for more than a month or indefinitely. Store registries are given to accounting to complete invoicing of storage customers, while part-load storage costs are already included in the service cost and sent to the consultant.

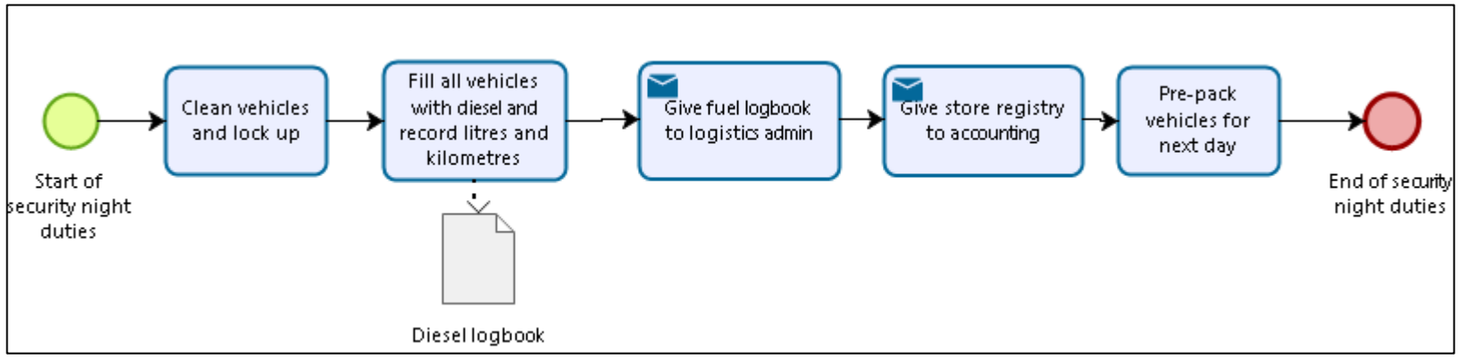


Figure 58: Security night duties sub-process- Security

Each night, security must clean the vehicles, fill them up with diesel and do the pre-packing of packing materials required for each vehicle for the next day's services.

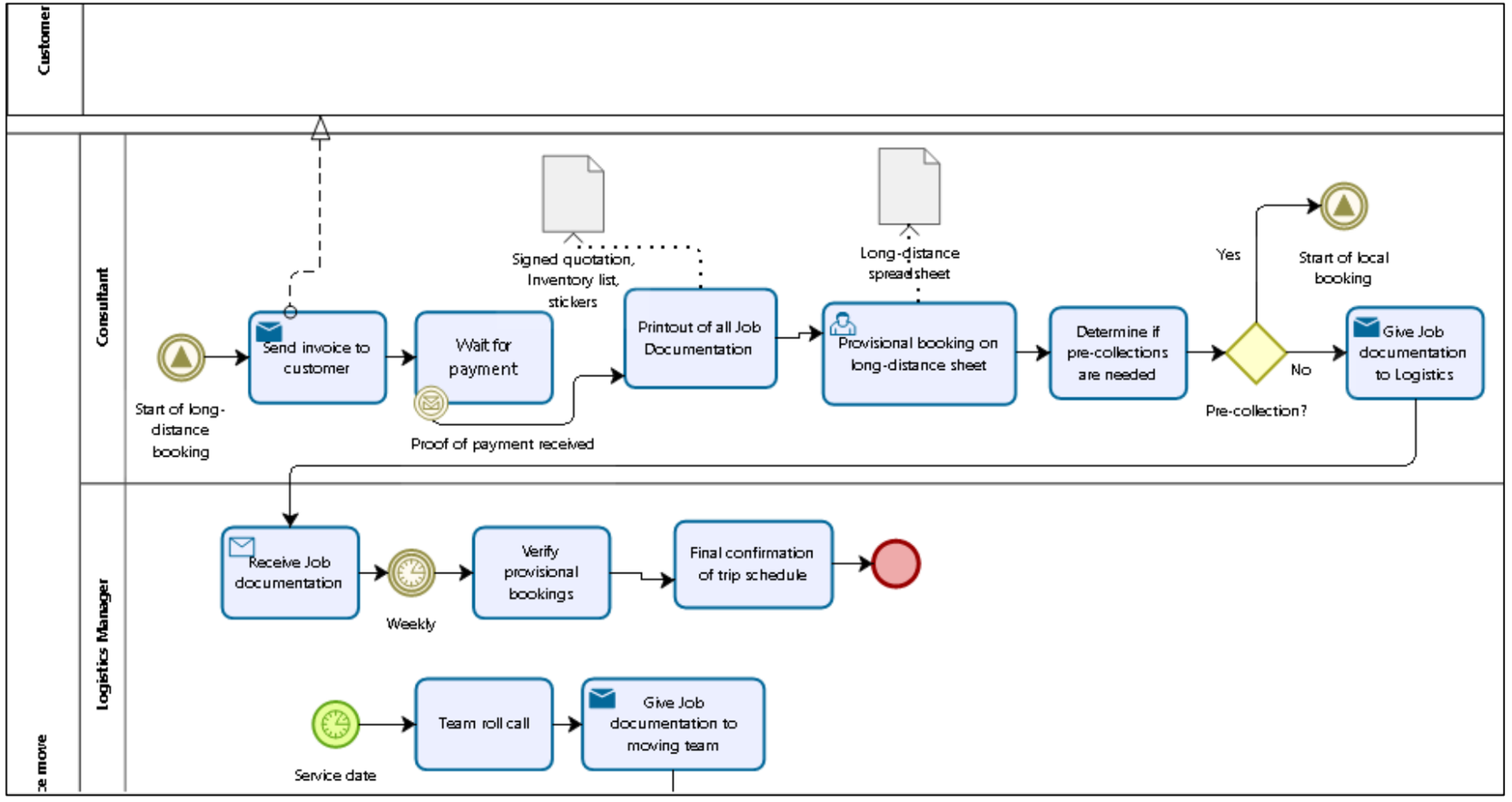


Figure 59: Booking to long-distance move part 1

For long-distance moves, all invoices must be made before the consultant makes a booking. If a pre-collection is required, where cargo must be collected locally and stored in the warehouse, the pre-collection is handled as a local service. If not, the consultant gives the documentation to logistics.

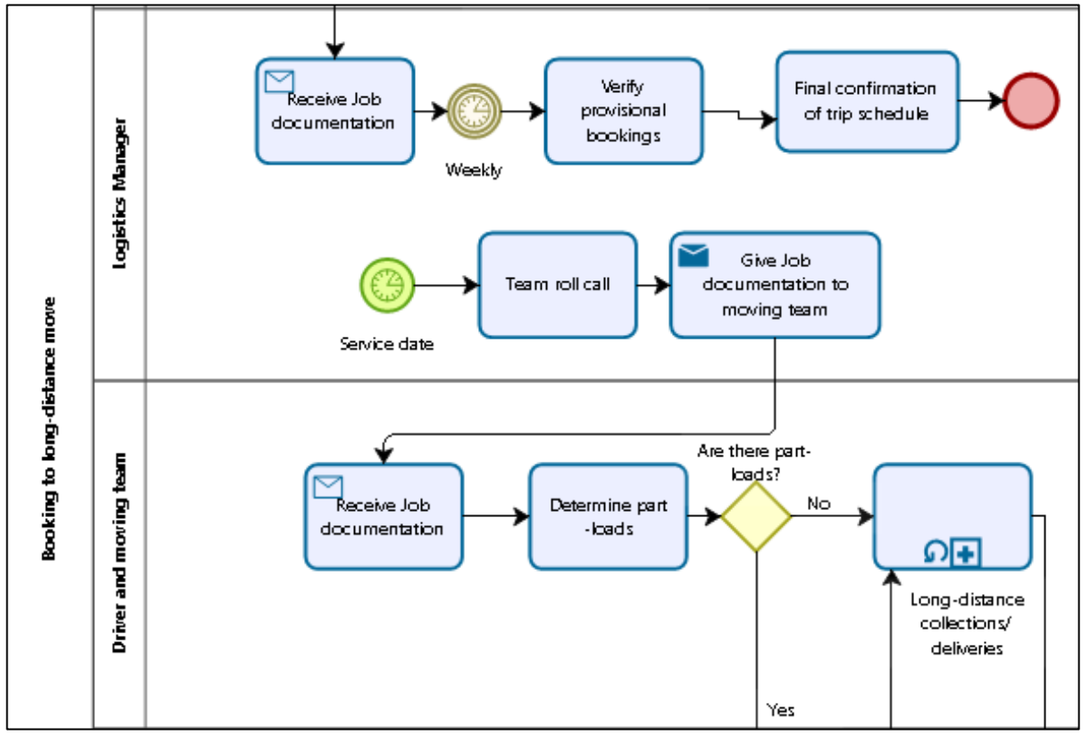


Figure 60: Booking to long-distance move part 2

The logistics manager receives the documentation and verifies the provisional bookings weekly. For long-distance confirmation of the schedule is done a week ahead of the service date. On the day of the service, the team receives the job documentation and determines whether there are any part-loads.

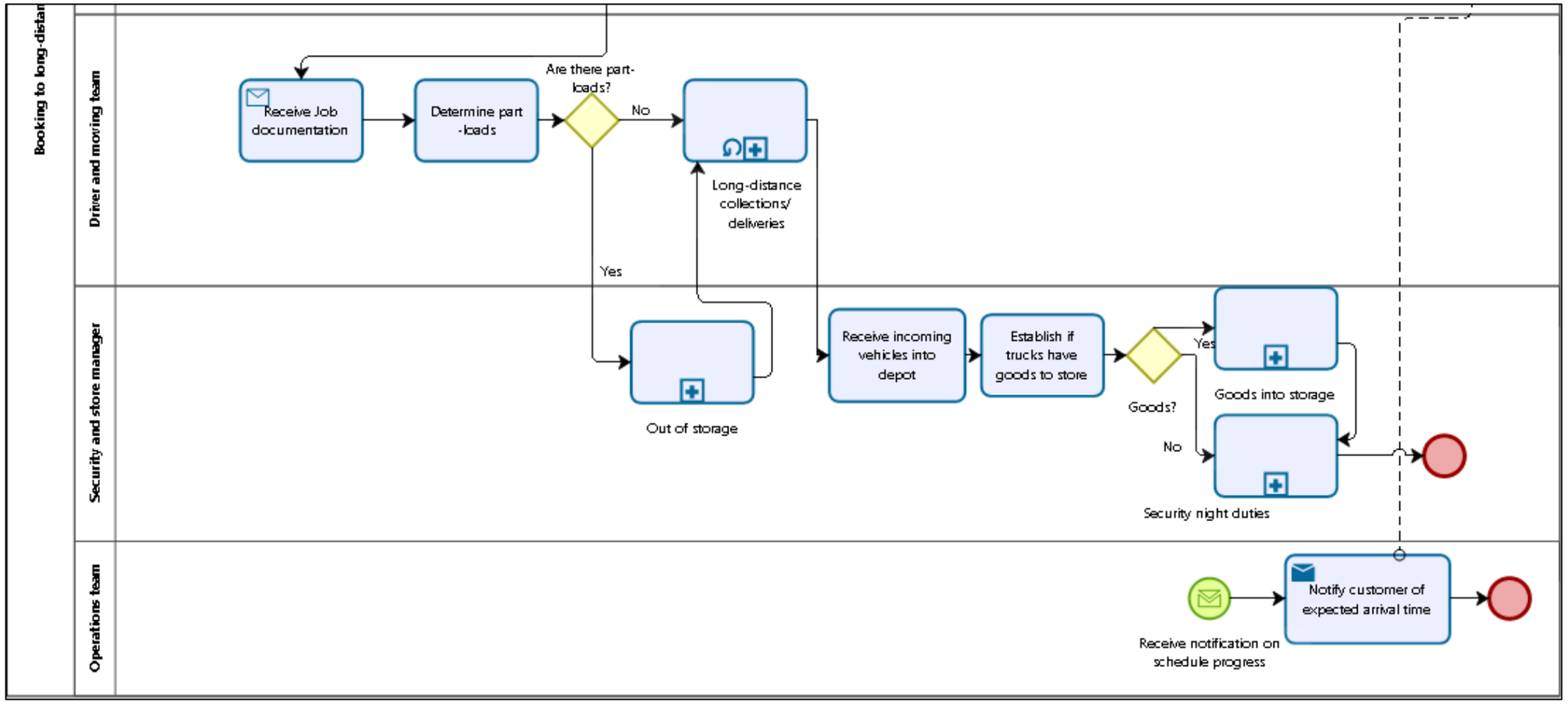


Figure 61: Booking to long-distance part 3

If there are part-loads, the warehouse manager will supervise in the Goods out of storage sub-process before the team leaves for long-distance deliveries and collections. The operations team is notified of the team's progress throughout the day.

The security receives the incoming vehicles and once-again determines if there are goods to store.

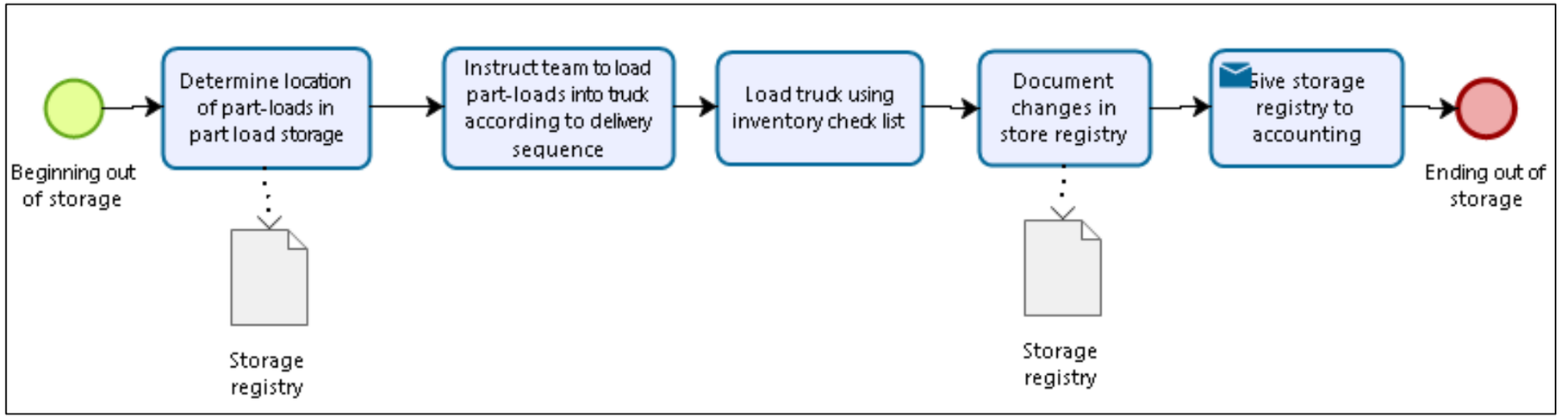


Figure 62: Out of storage sub-process-Warehouse manager

When goods are taken out of storage the warehouse manager updates the storage registry before giving it to accounting. An inventory check list is used to verify that all items are removed from the store.

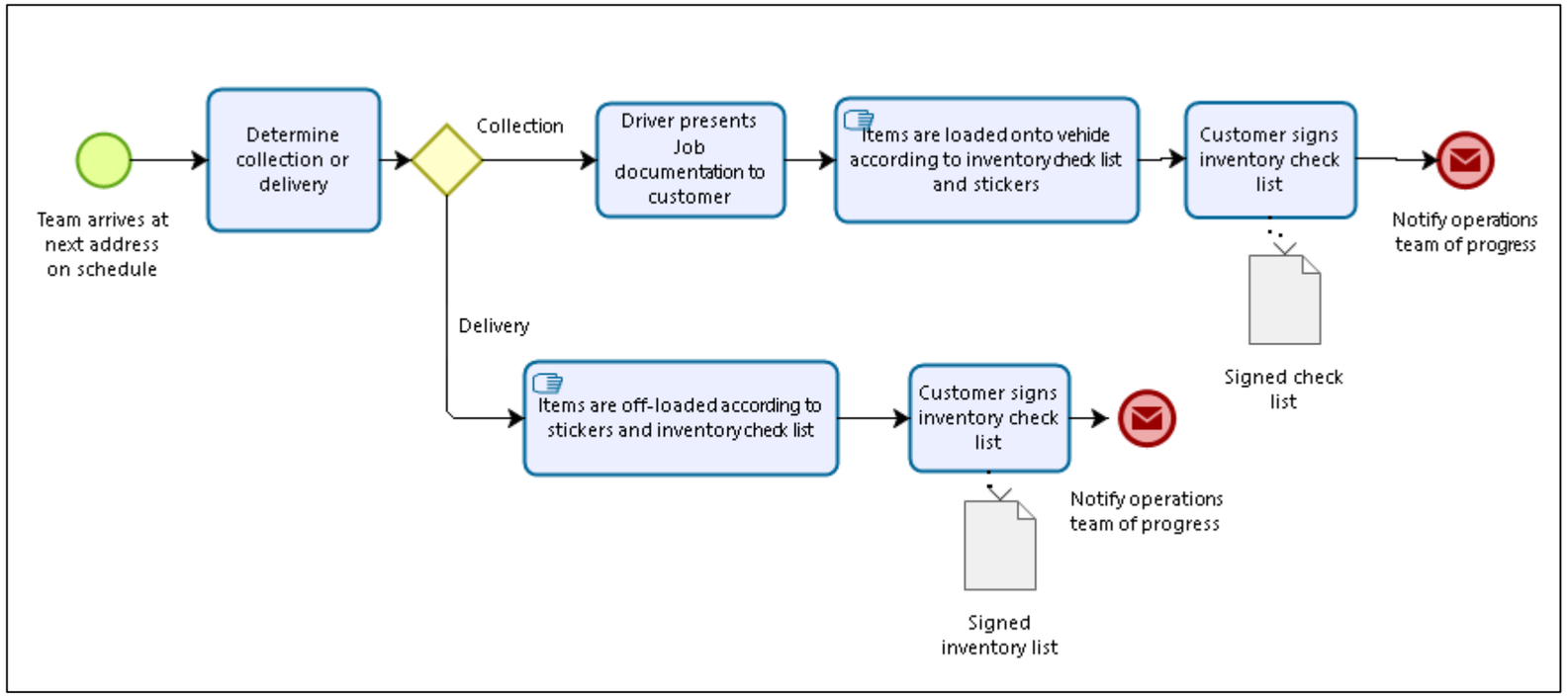


Figure 63: Long-distance deliveries and collections sub-process- Driver and moving team

Collections and deliveries on long-distance work like those of local moves, except that drivers must notify operations of progress throughout the duration of the trip.

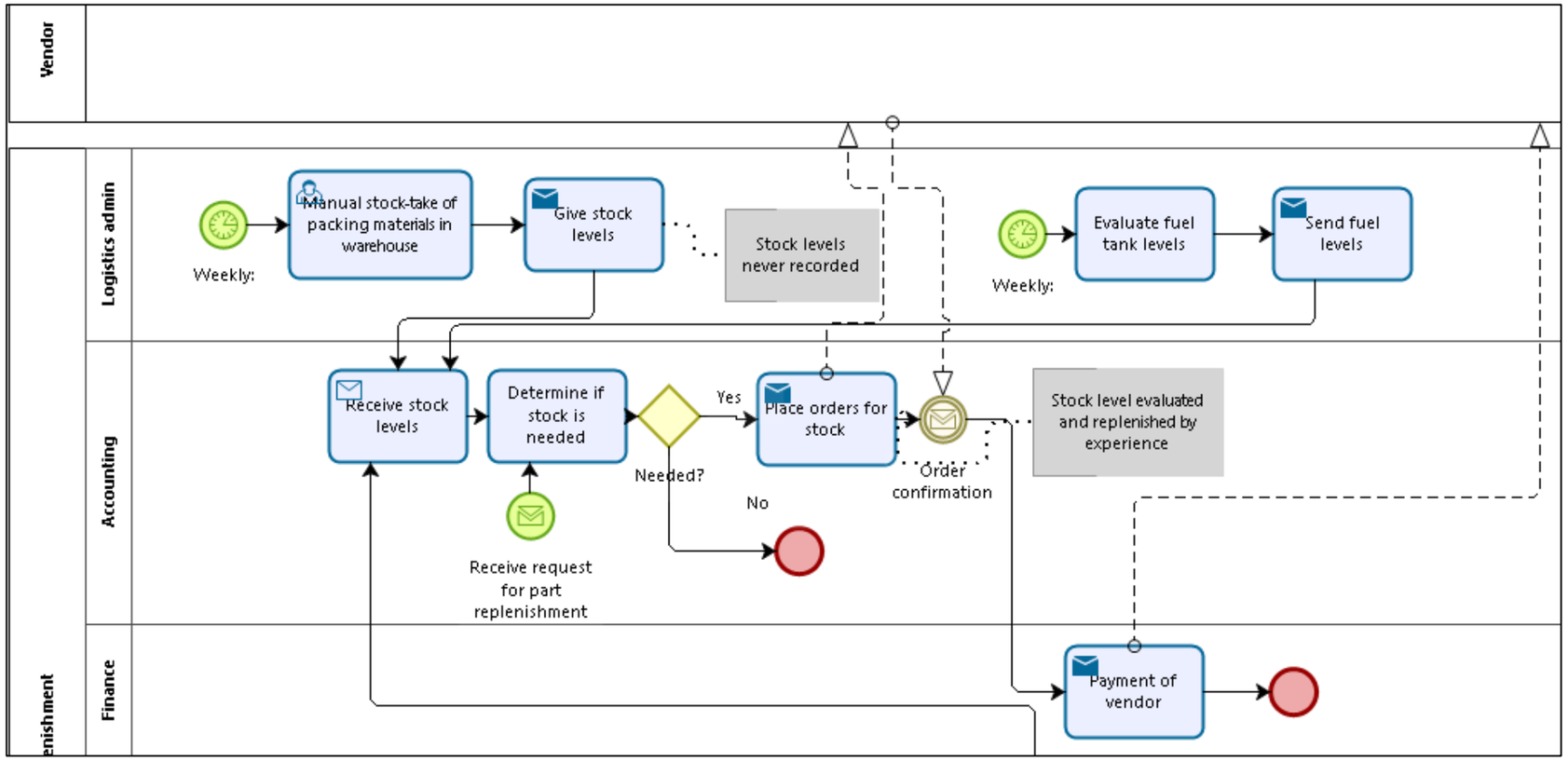


Figure 64: Replenishment part 1

Logistics admin weekly evaluate the initial levels of packing materials and fuel levels and report these to accounting who then decides whether more stock is necessary. If stock is required, an order is placed and after payment of the vendors, a delivery is made with the goods.

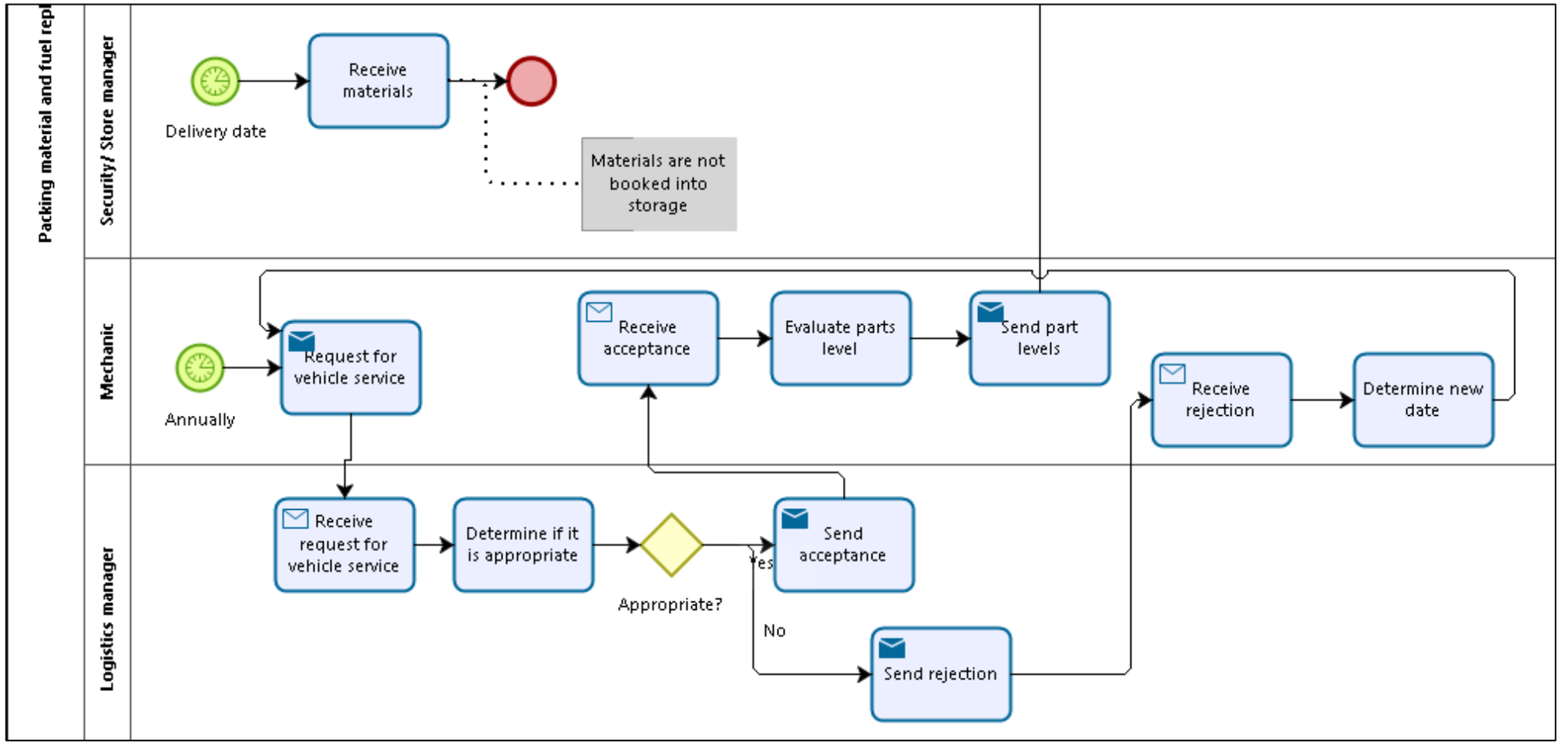


Figure 65: Replenishment part 2

When a service for a vehicle is due, the mechanic will request for the service of a vehicle and once the logistics manager confirms that the date is acceptable, the mechanic will evaluate the vehicle part levels. These part levels are reported to accounting who decides whether part replenishment should take place.

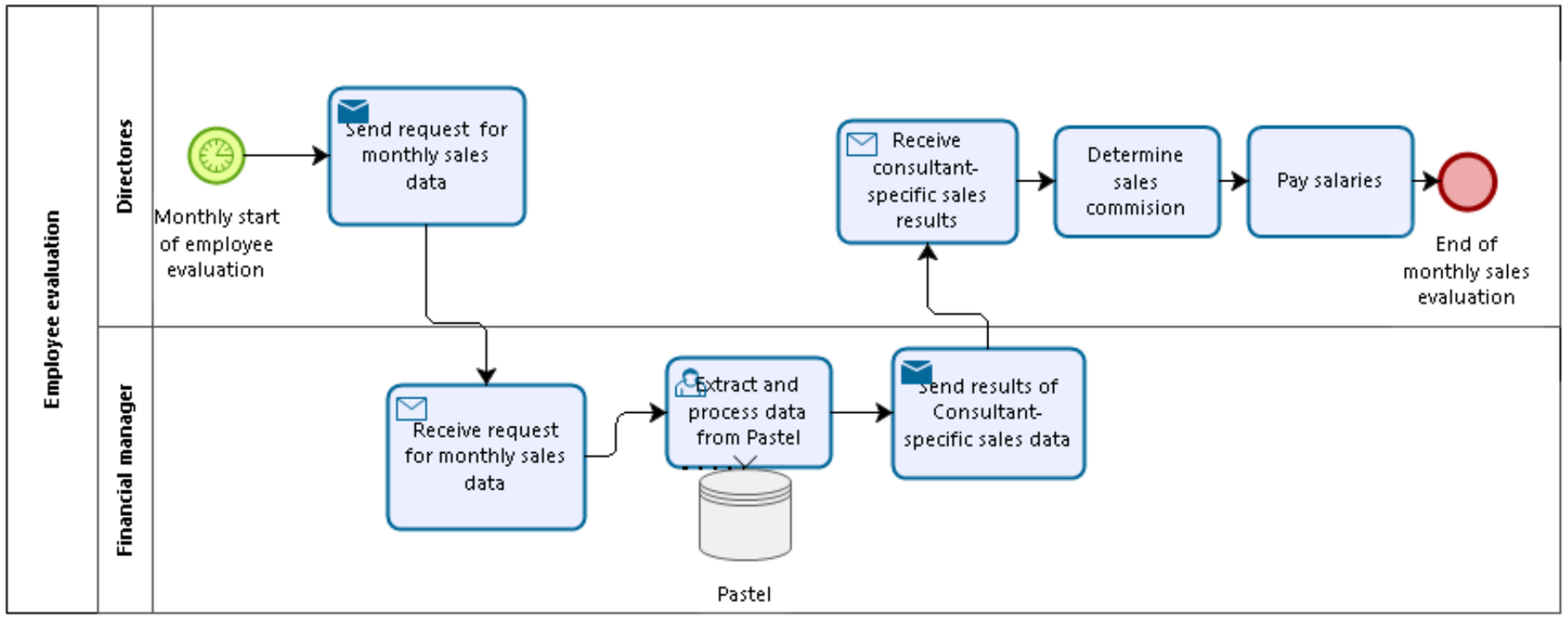


Figure 66: Employee evaluation

Consultants are paid sales commission in addition to their salaries based on their sales volume. Every month the directors of the company use the financial statements to evaluate the consultants' sales performance. When the sales commission is calculated, the employees receive their salaries.

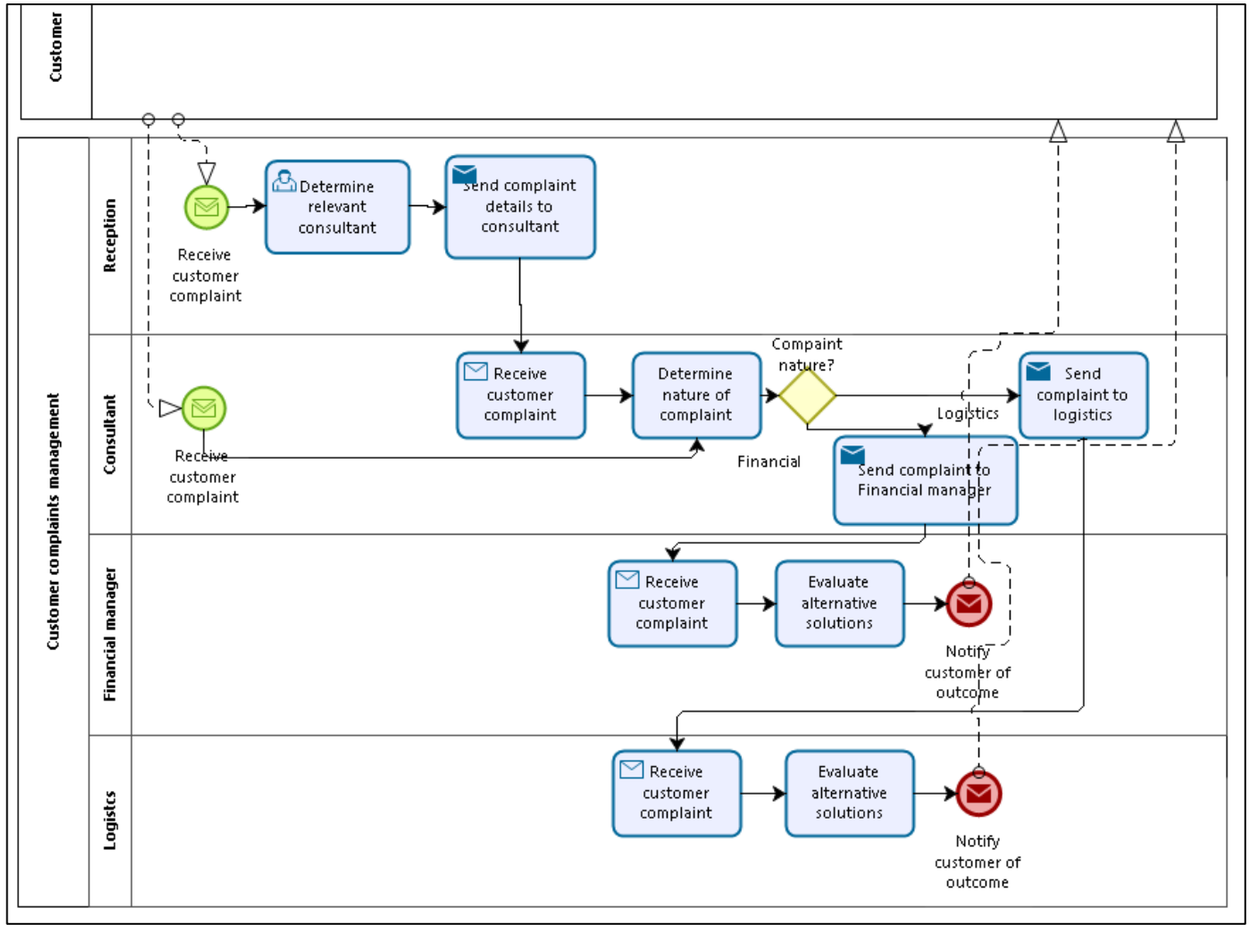


Figure 67: Customer complaints management

Complaints are received by either consultants or reception and then sent to the appropriate management figure.

11.9 Appendix I New process models

Process models and documentation are grouped according to roles.

11.9.1 Switchboard processes

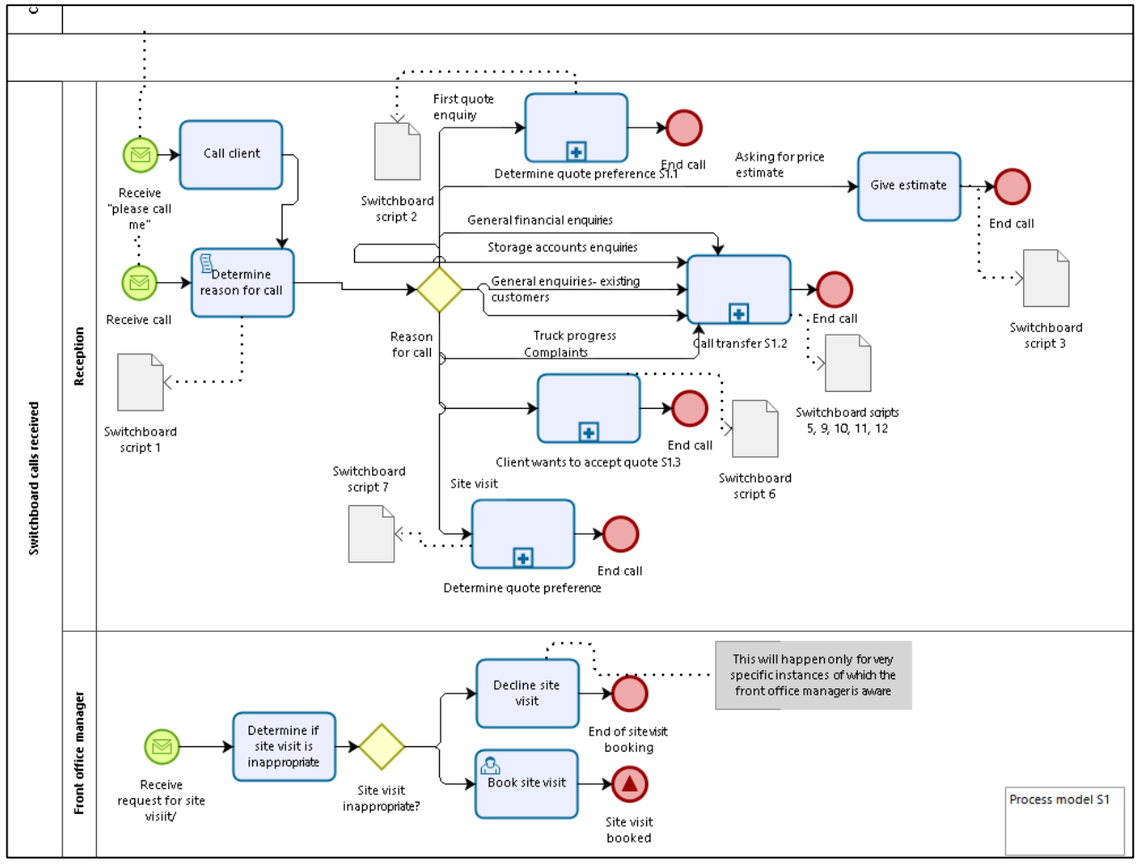


Figure 68: Switchboard calls process model S1

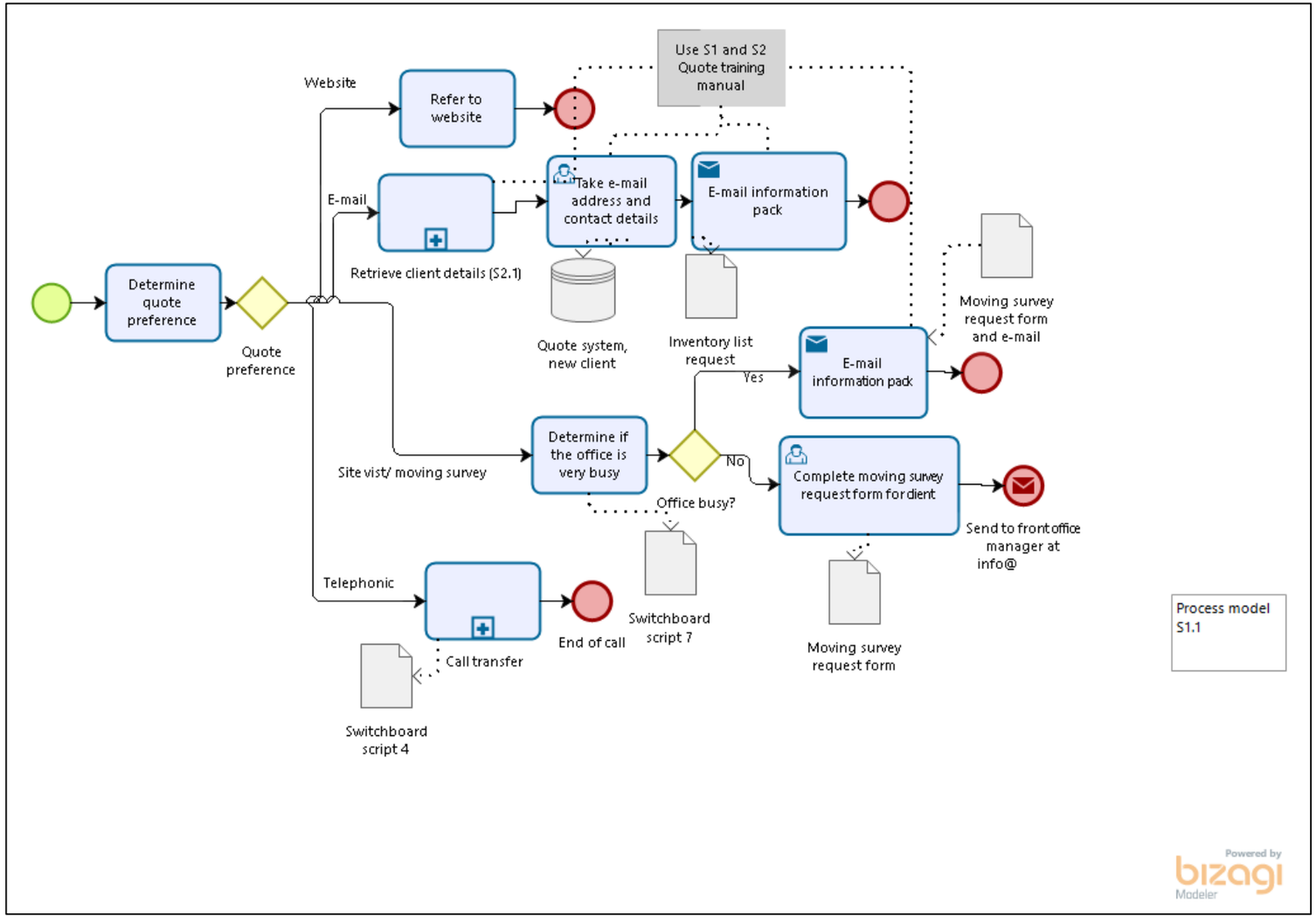


Figure 69: Switchboard calls sub-process S1.1

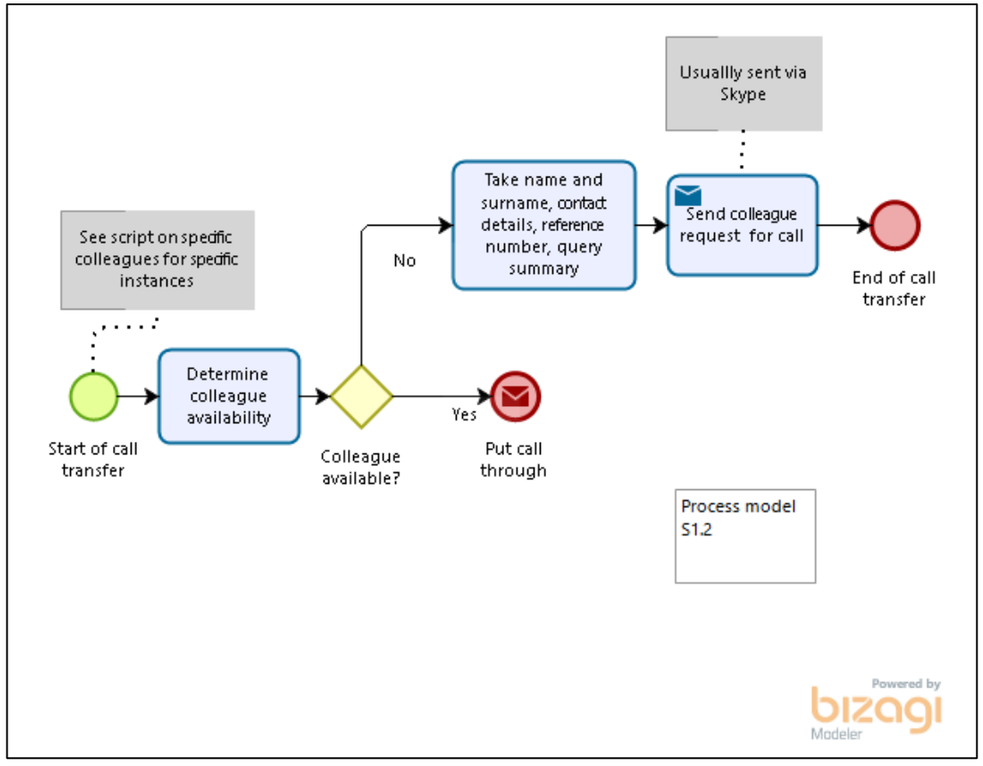


Figure 70: Switchboard calls sub-process S1.2

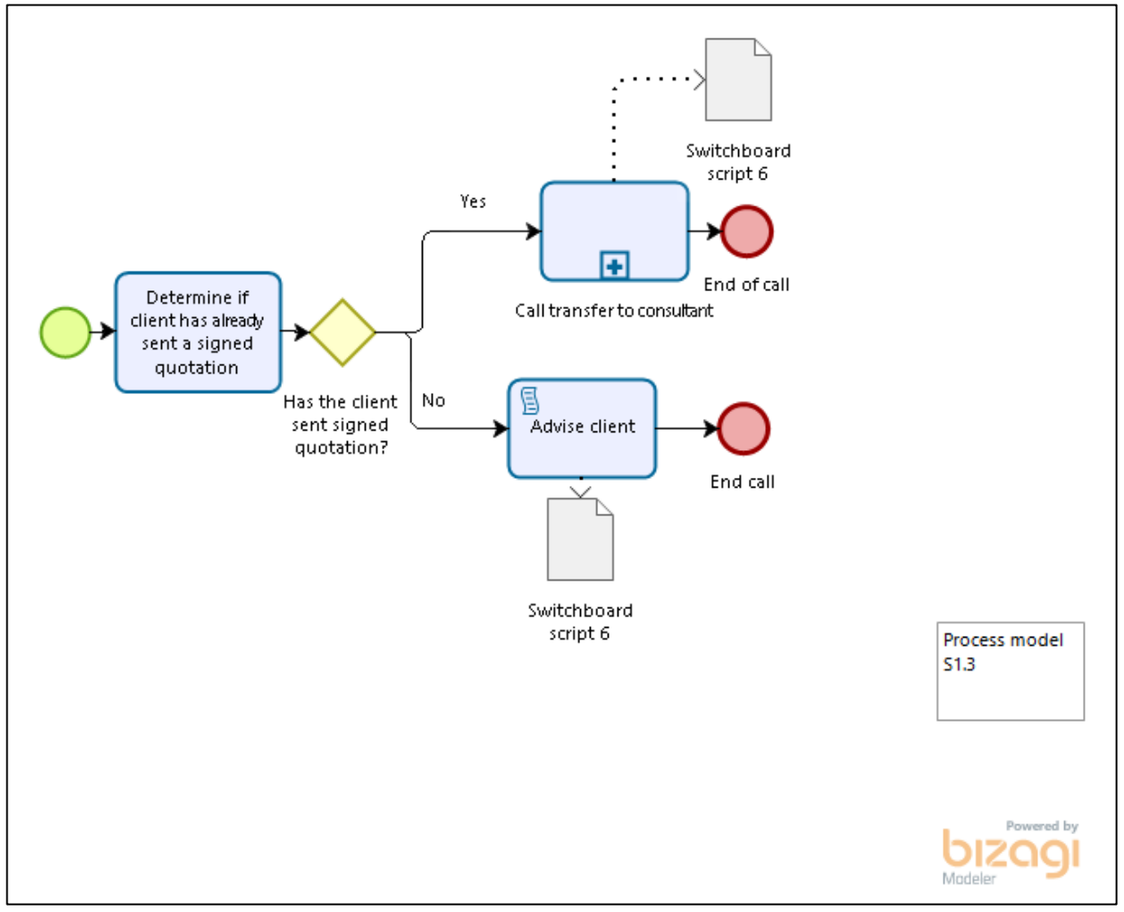


Figure 71: Switchboard calls sub-process S1.3

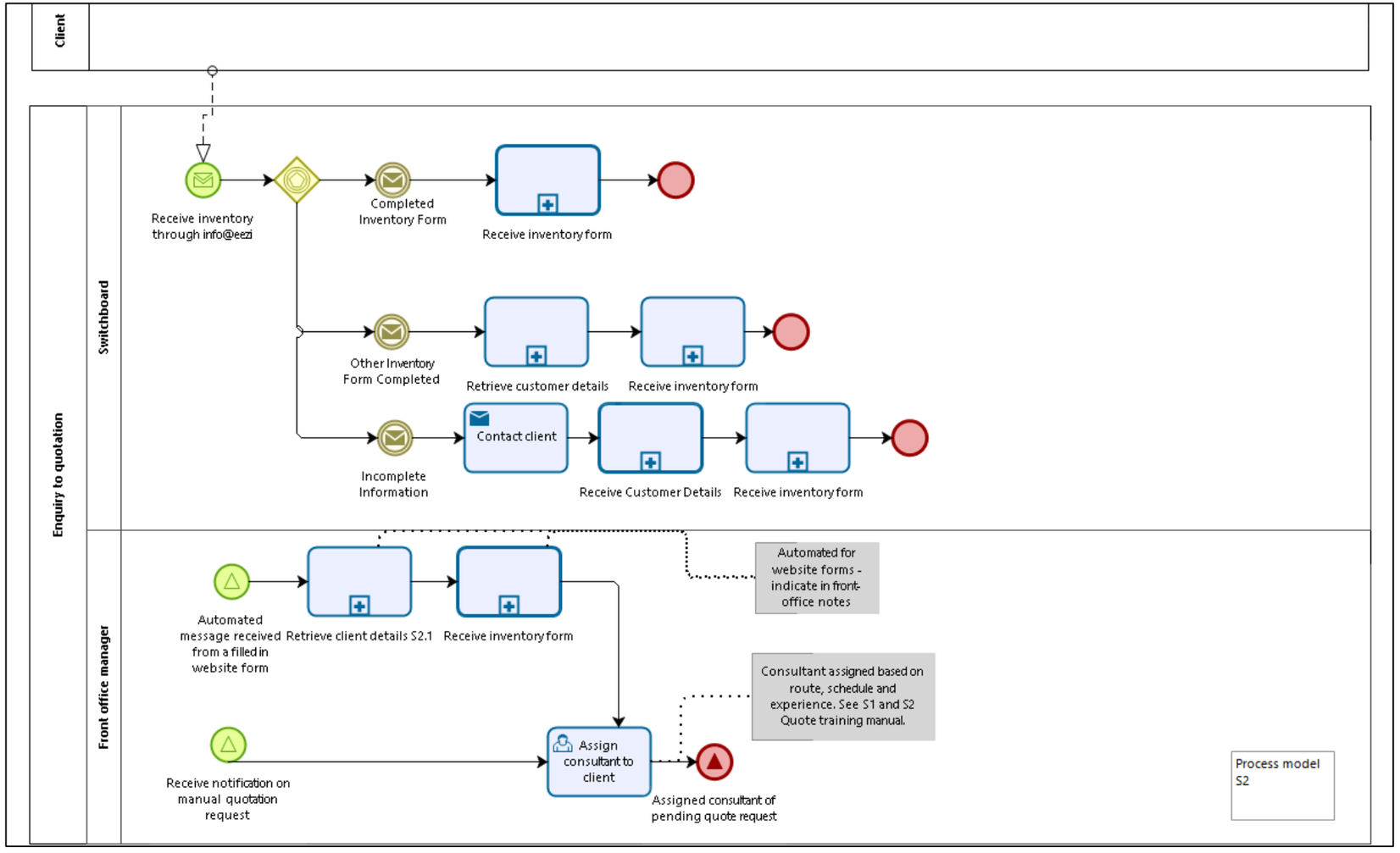


Figure 72: Switchboard enquiry to assign S2

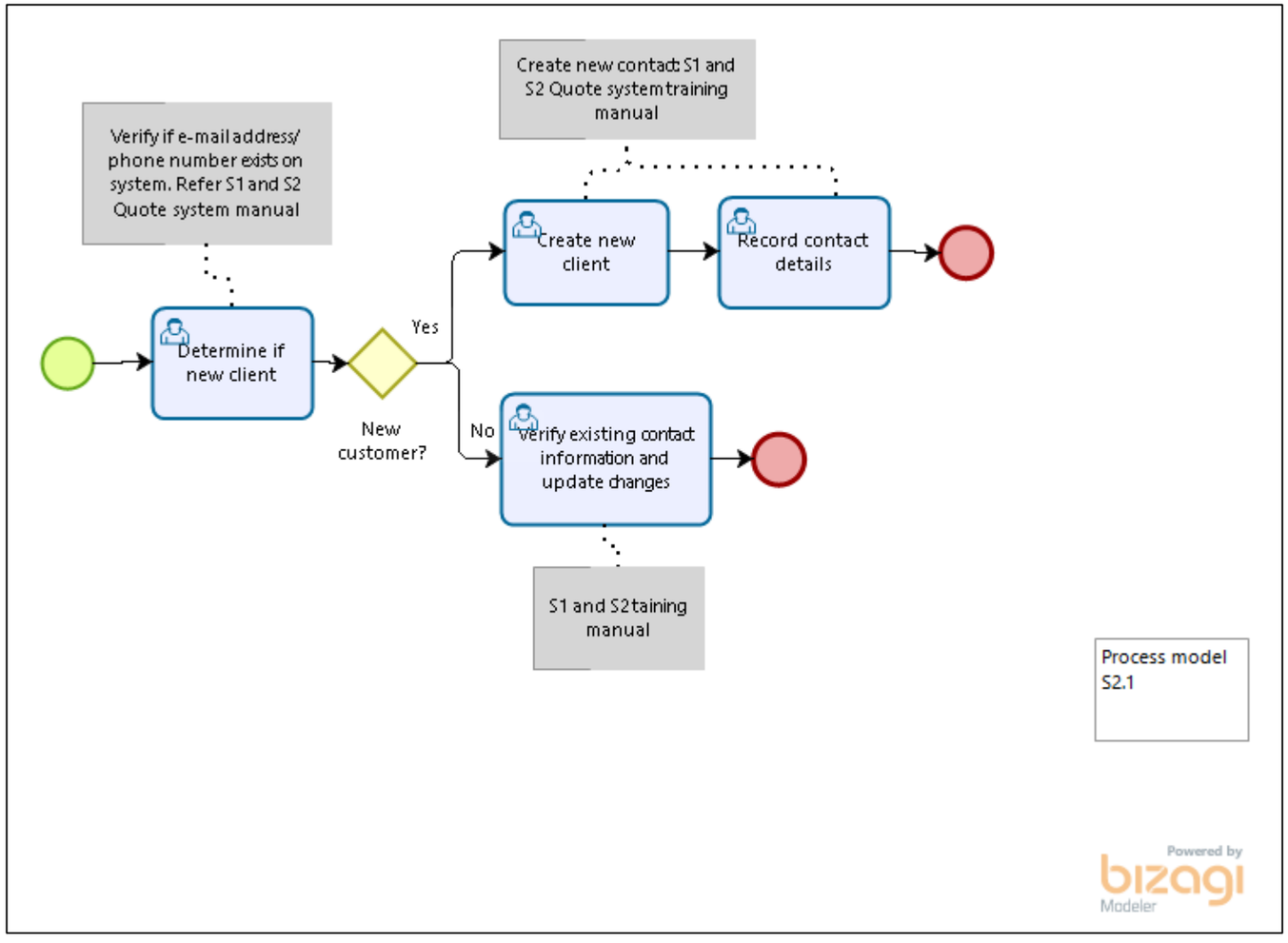


Figure 73: Switchboard retrieve client details sub-process S2.1

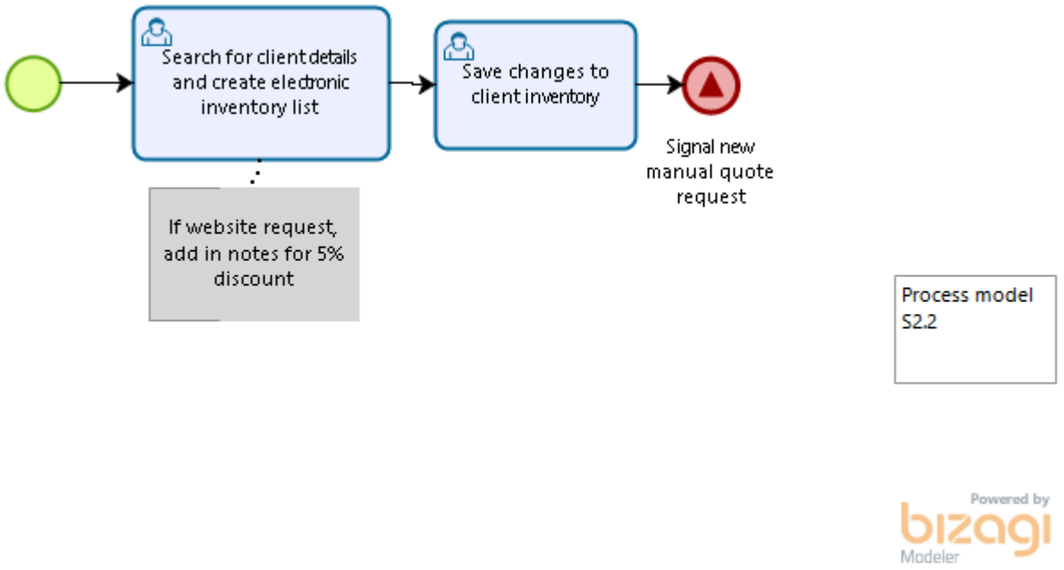


Figure 74: Switchboard receive inventory form sub-process S2.2

11.9.2 Switchboard communication script

Switchboard Script

Purpose:

Script nr	Process Model nr	Script	Reason
1	S 1	(No more than 4 rings.) Wait 2 seconds- Thank you for phoning Company ABC. **Name** speaking. How can we assist you?	Determine reason for calling.
2	S 1	Company ABC needs to be informed to be prepared. For Company ABC to supply you with an accurate quote, appropriate size vehicle and moving team, we will need a comprehensive inventory list. There are four options: 1. Qualify for a 5% discount by completing our online form. (This is a semi-automated process.) 2. We can e-mail you a form to complete. 3. For larger house and office removals we send out one of our experienced company representatives to do a full survey. 4. Telephonic quotation. When taking contact details, always verify e-mail address and phone number by reading back to client. (If enquiring about long-distance move CPT, KZN, Gauteng, Mpumalanga) Certainly, sir/ma'am. Our trucks service all major routes daily.	First quote enquiry.
3	S 1	(When enquiring on truck size) Please consider that we don't supply truck rentals, but deliver a comprehensive removal service. An accurate estimate is impossible without detailed information, but you can expect to pay: <u>8-ton truck/ single garage- Midmonth</u> Local PTA, CPT, DBN: R1400 – R2400 Local JHB: R1600- 2500 Same for a 2/3 bedroom <u>Long-distance</u> We can offer you a cost cutter option with a depot-to-depot delivery. <u>Half garage (estimated 800 cubes):</u> GAU - CPT: R 5,000-6,000 CPT – GAU: R 4,000-R5,000 DBN-GAU and vice versa: R4,000-5,000 <u>Single garage (estimated 1500 cubes):</u> GAU - CPT: R 10,000-12,000 CPT – GAU: R 8,000-R10,000 DBN-GAU and vice versa: R6,000-8,000	Asking for estimate.

Script nr	Process Model nr	Script	Reason
		Please consider vehicle restrictions and other factors may influence the estimated price. Refer to script 2. Give options for formal quote.	
4	S 1	If client requests a telephonic quote, put him/her through to appropriate consultant Charlene: CPT local and long-distance back Letitia: Gauteng local, Gauteng- CPT Monique: Durban	Telephonic quotation starts
5	S 1	Put through to consultant	General enquiries, existing client.
6	S 1	Have you signed the quotation and the contract and sent it to us? If yes: Put through to consultant so consultant can confirm receipt of documentation. If not: Can you please sign the quotation together with the contract and send it to your consultant ASAP? After receiving your signed quotation, the consultant will contact you for final arrangements. If more questions, put through to consultant.	Client wants to accept a quote.
7	S 1	If the office is not too busy: Complete moving survey form with client on the line. If the office is busy: Send moving survey request form. If client does not want to complete a form, take contact details and moving address.	Ask for site visit/ moving survey.
8	S 1	Take client name and surname, reference number, query summary, contact number	Transfer to assigned consultant, unavailable take message
9	S 1	Out of storage: Determine consultant, if client doesn't know, take client details and find out. Let consultant call back. If enquiring about storage finances, put call through to finances.	Storage accounts
10	S 1	Put call through to finances.	General financial enquiries
11	S 1	Put call through to appropriate person Local: PTA/ JHB- Annelize (extension or cell) DBN- Jacky CPT- Alberto/ Francois Long-distance: Alberto/ Francois (Chris)	Truck progress (local, long-distance)

Script nr	Process Model nr	Script	Reason
		If appropriate person is not available, put through to consultant.	
12	S 1	Move in progress: (NB Client must speak to someone immediately. No messages.) Long-distance- Chris Local Gauteng- Annelize Local Durban- Jacky Local Cape Town- Ops (Service related complaint- Send representative- Policy) After move: Must try to resolve telephonically first.) CPT locals- Charlene and Annali DBN locals- Monique Gauteng locals- Annelize Long-distance- Chris	Complaints

General comments

Use affirmative language, e.g. most certainly, rather than yes.
Listen intently to what client wants.
When taking contact details, always verify e-mail address and phone number by reading back to client.
Before putting a call through to a colleague, notify colleague of caller.

Standard documentation and e-mails

First quotation enquiry e-mail
Site visit (moving survey) enquiry e-mail
Inventory list request

11.9.3 Switchboard role description

Role Description

1. Role

This role: Switchboard

Reports to: Front office manager

2. Purpose

Serve the customer telephonically and via e-mails for first and general enquiries. During the first enquiry, the importance of a detailed and accurate inventory list must be highlighted.

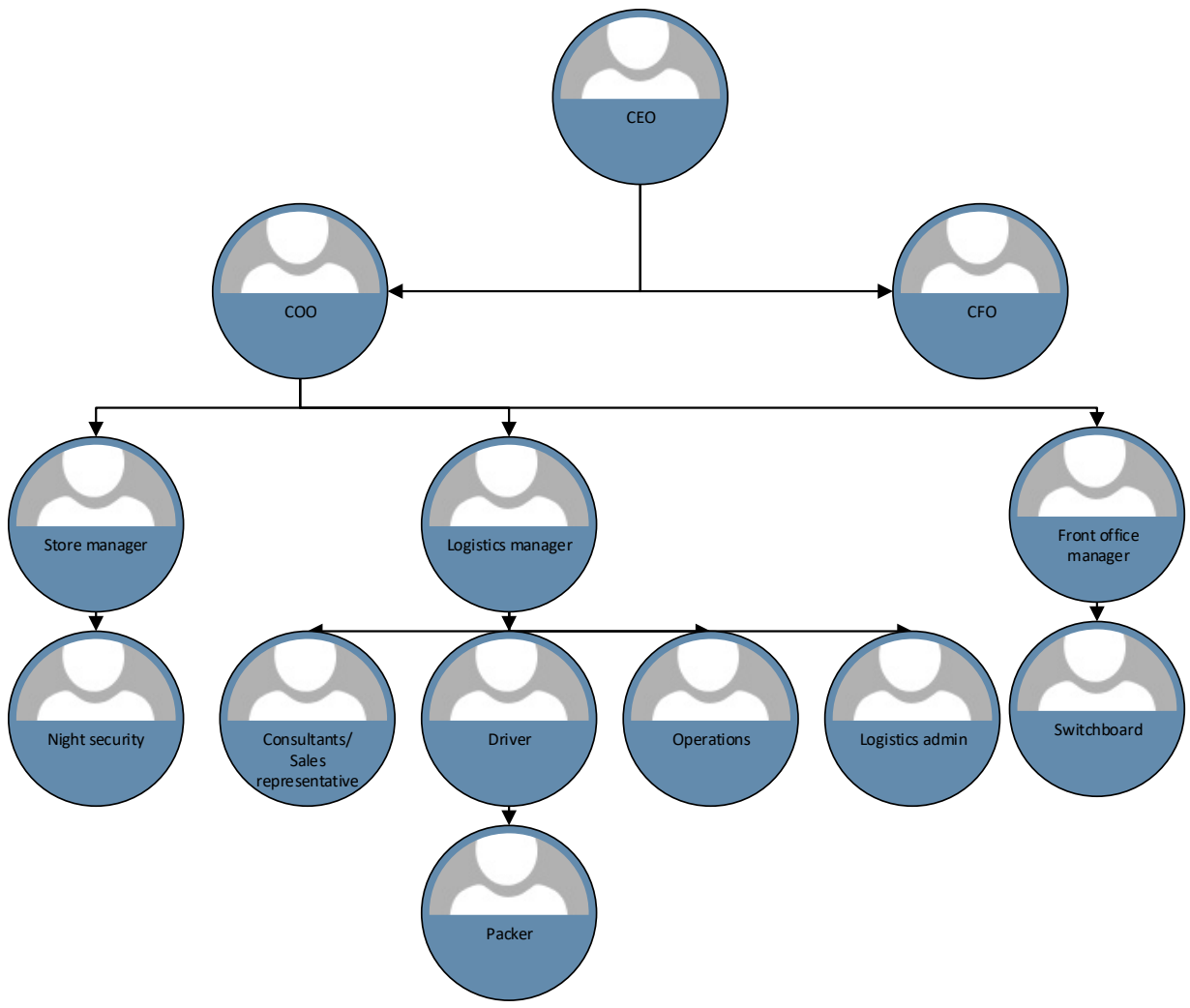
Key performance areas

2.1 KPA 1: Swift response to calls.

2.2 KPA 2: Swift e-mail response to general and first enquiries.

2.3 KPA 3: Completing initial customer entry on system

3. Organisational structure



4. Role

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Answer all office telephone calls	Switchboard Scripts, Process model S 1
KPA 2	- E-mail response to general and first enquiries.	Switchboard e-mail communication
KPA 3	- Enter new enquiring customer into system	System training manual

5. Skills and Education

KPA	Skill
Telephone communication	1. Good telephonic communication.
E-mail response	2. Basic computer literacy.
New customer entry	3. Training on quotation system.

6. Competencies (Internal)

Competency	Level
Basic Training	Do
Consultant Training	Informed
Service and Maintenance	Informed
Transport and Logistics	Informed
Procurement	N/A
Customer Satisfaction, Communication and Telephonic Selling	Do

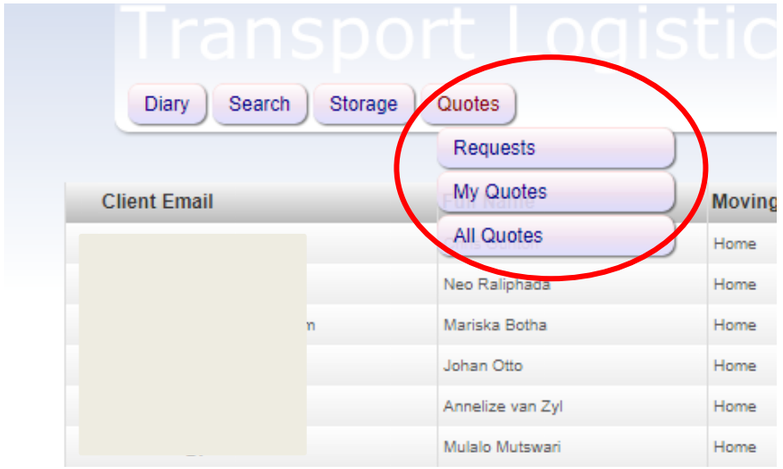
7. Measures of success

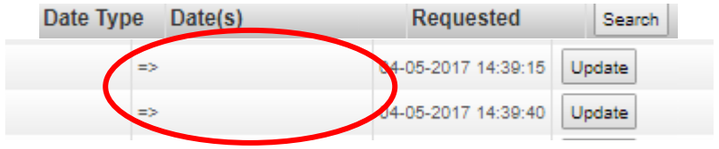
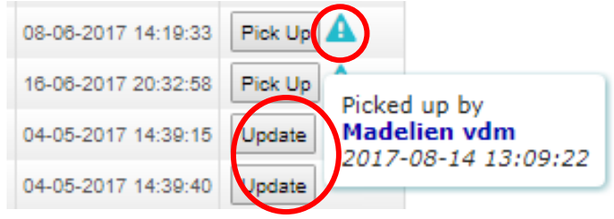
Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Calls not missed	4	3	2	1	0
Average e-mail response time to customers	120 min	90 min	60 min	30 min	10 min

11.9.4 S1 and S2 Quotation system training manual

Roles concerned	Switchboard
	Front office manager
	Consultants
	Logistics
Process models involved	S1
	S2

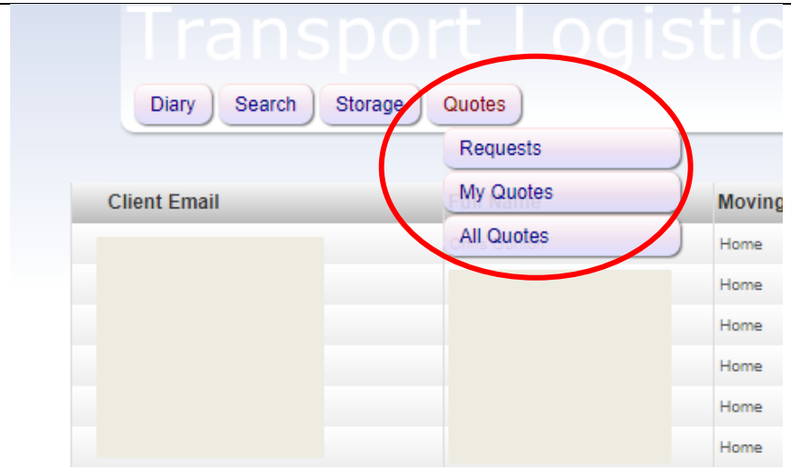
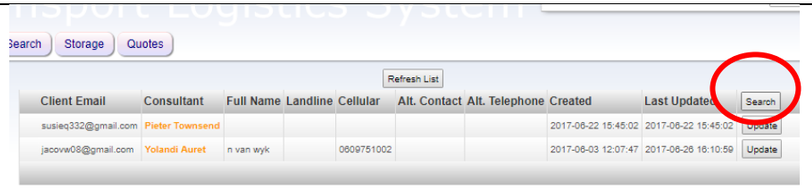
11.9.4.1 Basic switchboard screen

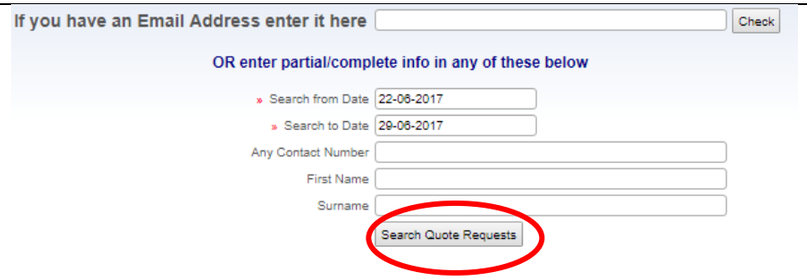
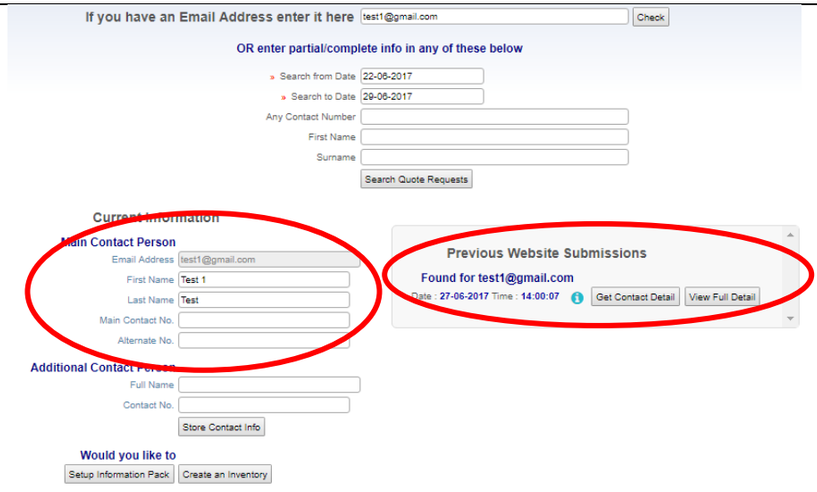
Explanation	Screen shot
Toggle to Quotes and choose “Requests”	
A screen will appear containing all unassigned clients.	
Green indicates a future date, orange indicates today’s date and red dates are in the past.	

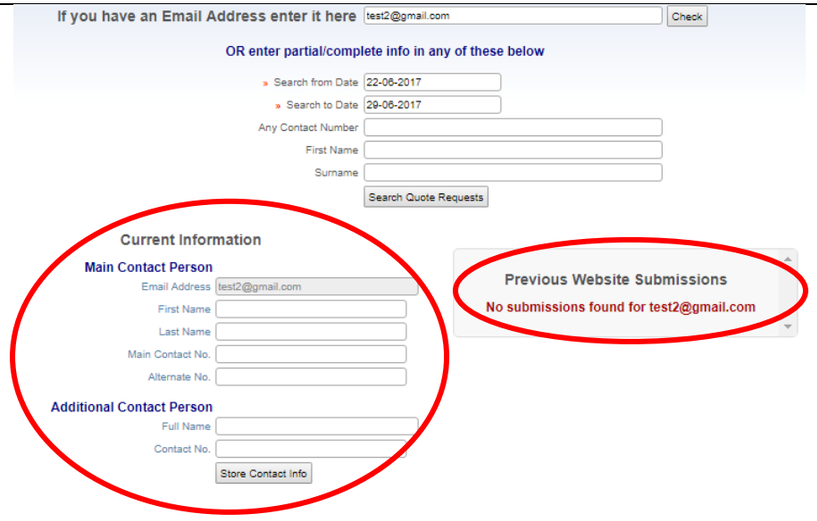
Explanation	Screen shot
No dates indicate a request for a manual inventory form.	
In the last column, website requests are “picked up” by front office. Once a request is “picked up” a blue triangle and the user appears next to it. Other forms are simply updated.	

11.9.4.2 Retrieve client details (S1 and S2)

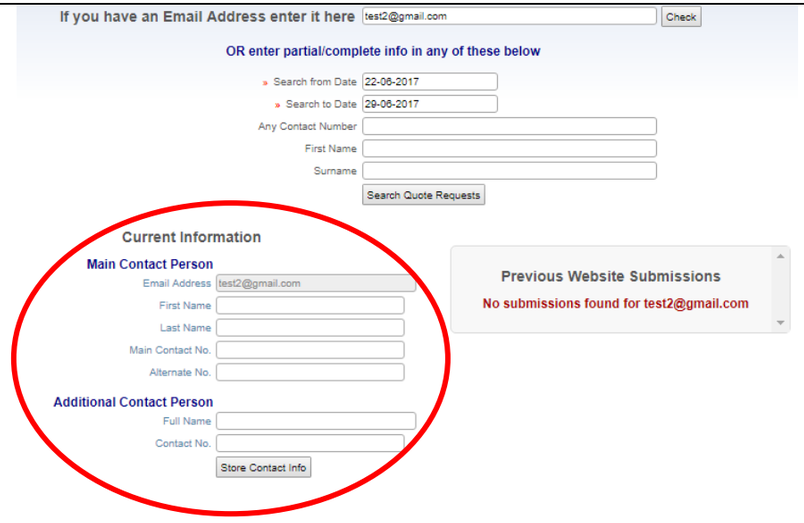
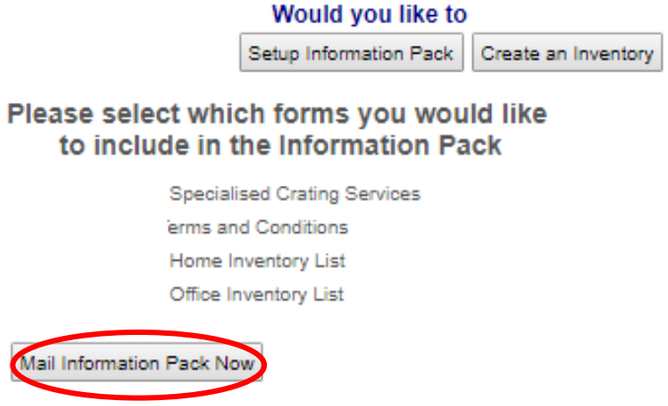
11.9.4.2.1 Determine if existing client and create new

Step	Explanation	Screen shot
1	Toggle to Quotes and choose “Requests”	
2	In the top right corner, select the search button.	

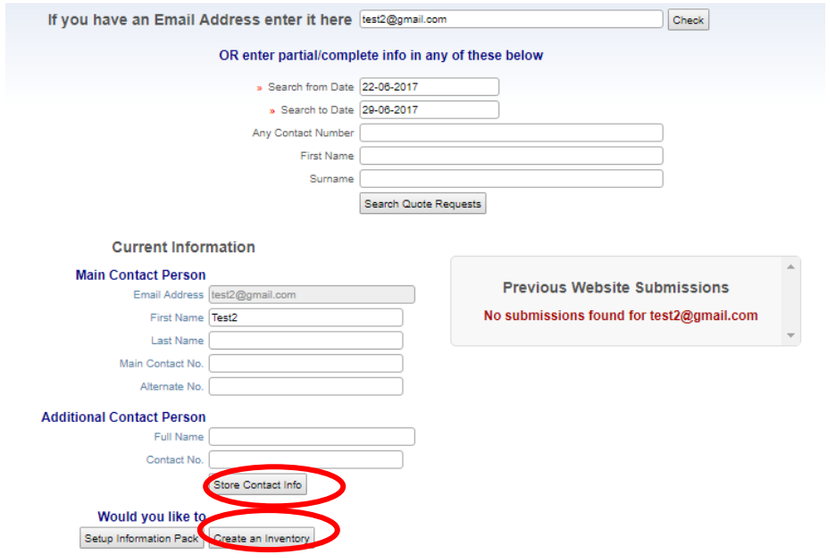
Step	Explanation	Screen shot
3	If you have any of the contact information, complete the fields below. Then press the “Search Quote Requests” button to look for results.	
4	On the screen shot it is evident that the client’s details are already on the system with the initial information on the client to the left of the screen and previous website submissions to the right. Therefore, a new client is not created.	

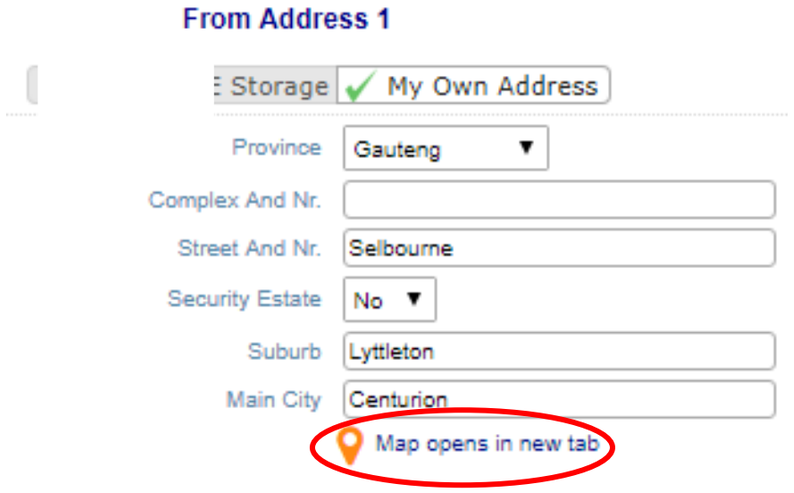
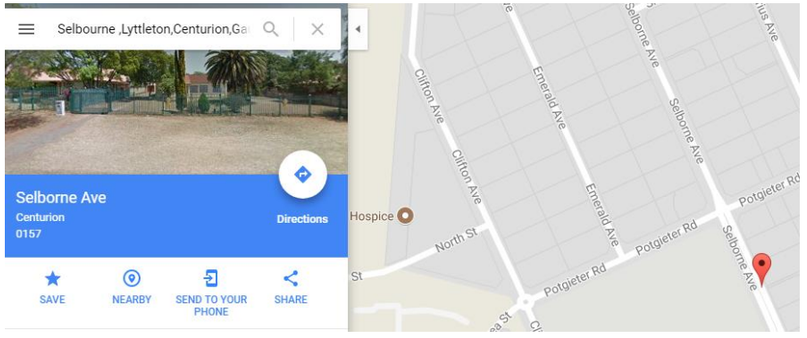
Step	Explanation	Screen shot
5	If the client's contact details and previous submissions cannot be found, create a new client. Complete the fields under initial information and press the "Store Contact Info" button. The client now appears as an existing client on the system.	

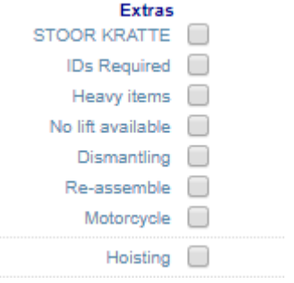
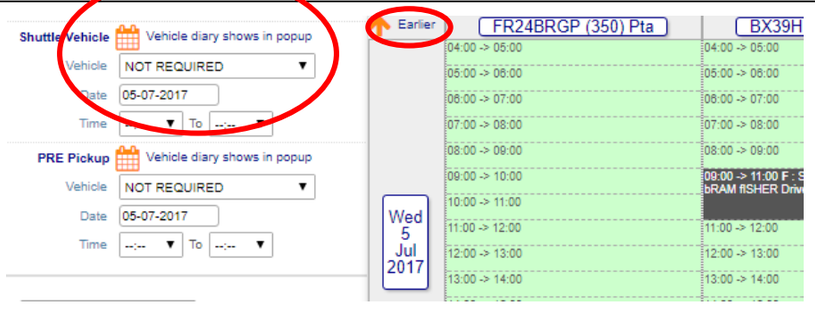
11.9.4.2.2 E-mail information pack (inventory or site-visit request form S 1.1)

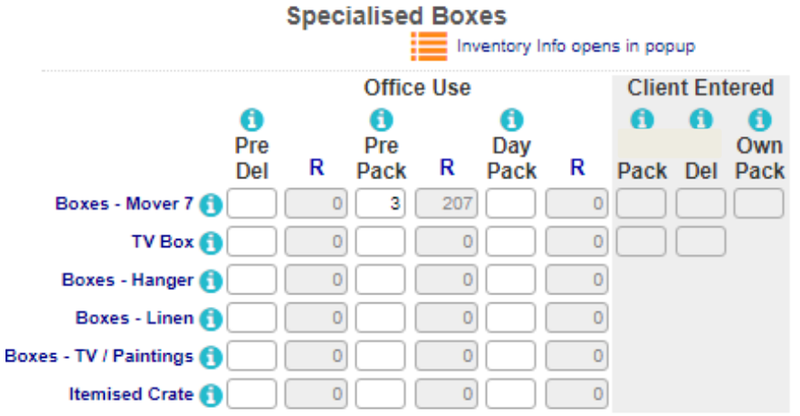
Step	Explanation	Screen shot
1	Store the information entered by selecting the "Store contact info" button. Choose "Setup an information pack" button.	
2	Tick the boxes for forms that you want to include in the e-mail. Then click: "Mail information Pack Now" button.	

Receive inventory forms (S2.2)

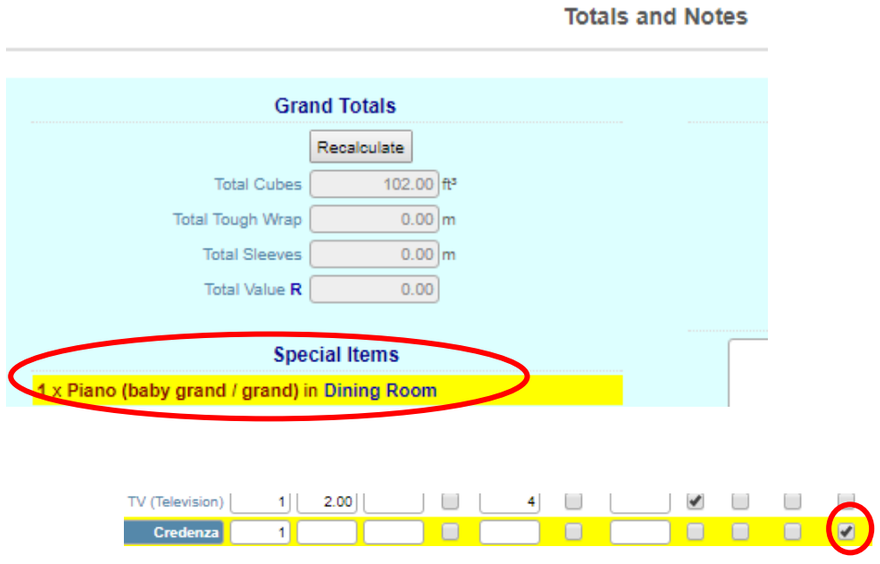
Step	Explanation	Screen shot
1	Search for the client according to details and store any additional contact information by pressing the “Store contact info” button. Press the “Create an inventory” button where after an electronic inventory list appears.	

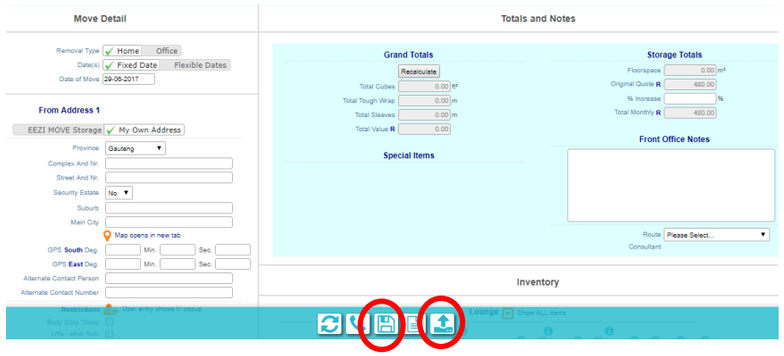
Step	Explanation	Screen shot
2	Complete the address by completing the fields.	
3	Once fields are complete, press the orange button to open the address in Google maps.	

Step	Explanation	Screen shot
4	To add restrictions, tick relevant tick boxes. Press orange button to see restrictions entered by client in website form.	
5	To add extra requirements, tick the relevant boxes under extras.	
6	To book a shuttle vehicle, select the orange diary for the diary popup of all possible shuttle vehicles for the specified date. Select “Earlier” or scroll down	

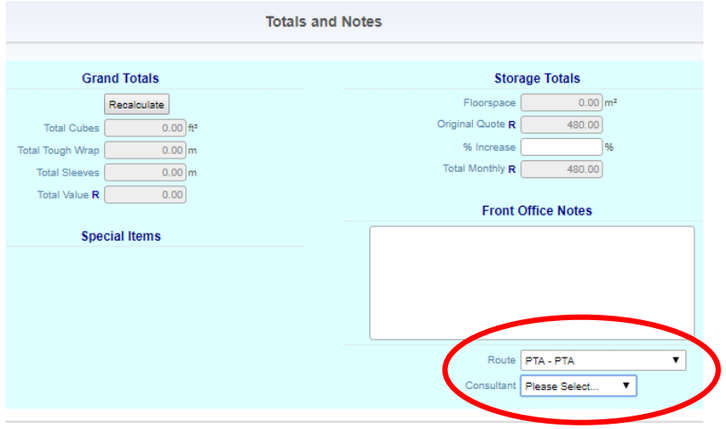
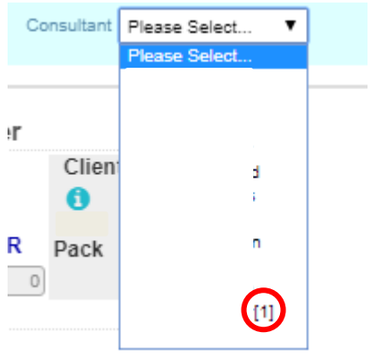
Step	Explanation	Screen shot
	to view other dates.	
7	At specialised boxes, select the quantity of each box to be pre-delivered, pre-packed or packed on the day of the move. The price is generated automatically. If the client specified boxes to be packed or delivered by Company ABC in the online request, these quantities are shown to the right. Client's own quantity of boxes are also shown to the right.	

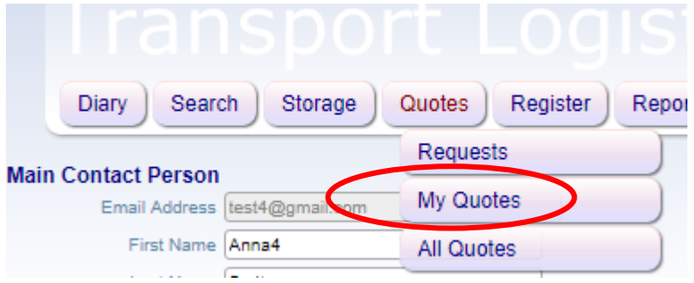
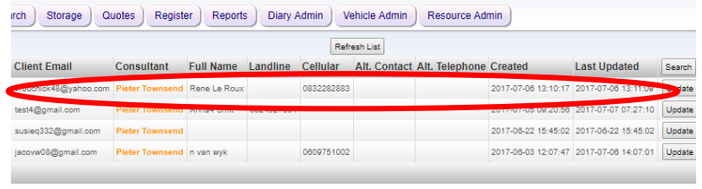
Step	Explanation	Screen shot
8	Choose the “Show all items” button and choose the appropriate items on the list. For items that are not already on the list, choose “Add more to room” button and manually complete item details.	
9	For additional items pre-populated from website form, highlighted in blue, add appropriate volume.	

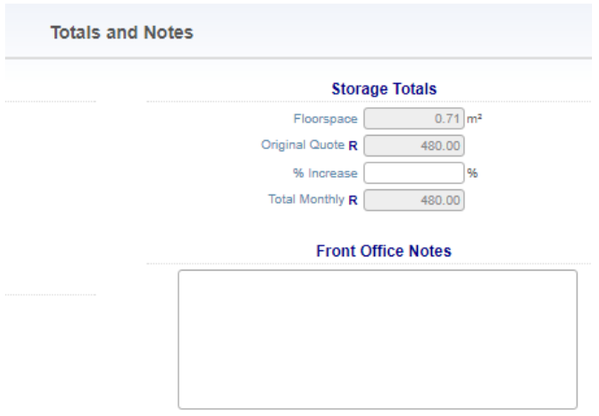
Step	Explanation	Screen shot
10	The volume will be generated automatically once progress is saved or volume is re-calculated.	
11	When adding a special item from the list, the item appears under “special items.” Items can also be marked as special items in the last column.	

Step	Explanation	Screen shot
12	Complete the list and save changes using the save button in the middle of the screen. Choose the “Upload document” button to attach original inventory list	

11.9.4.2.3 Assign client to consultant S2

Step	Explanation	Screen shot
1	At the top right of the inventory list, first select route based on collection and delivery addresses. Then choose appropriate consultant from the dropdown list.	
2	When selecting a consultant, the number of outstanding quotes for that consultant are visible in block brackets.	

Step	Explanation	Screen shot
3	Once a consultant has been assigned to the client, the client will appear under all quotes and “My quotes” for the specific consultant.	 

Step	Explanation	Screen shot
4	Make any additional notes using the block provided at the top right of the inventory list.	

11.9.5 Consultant process models

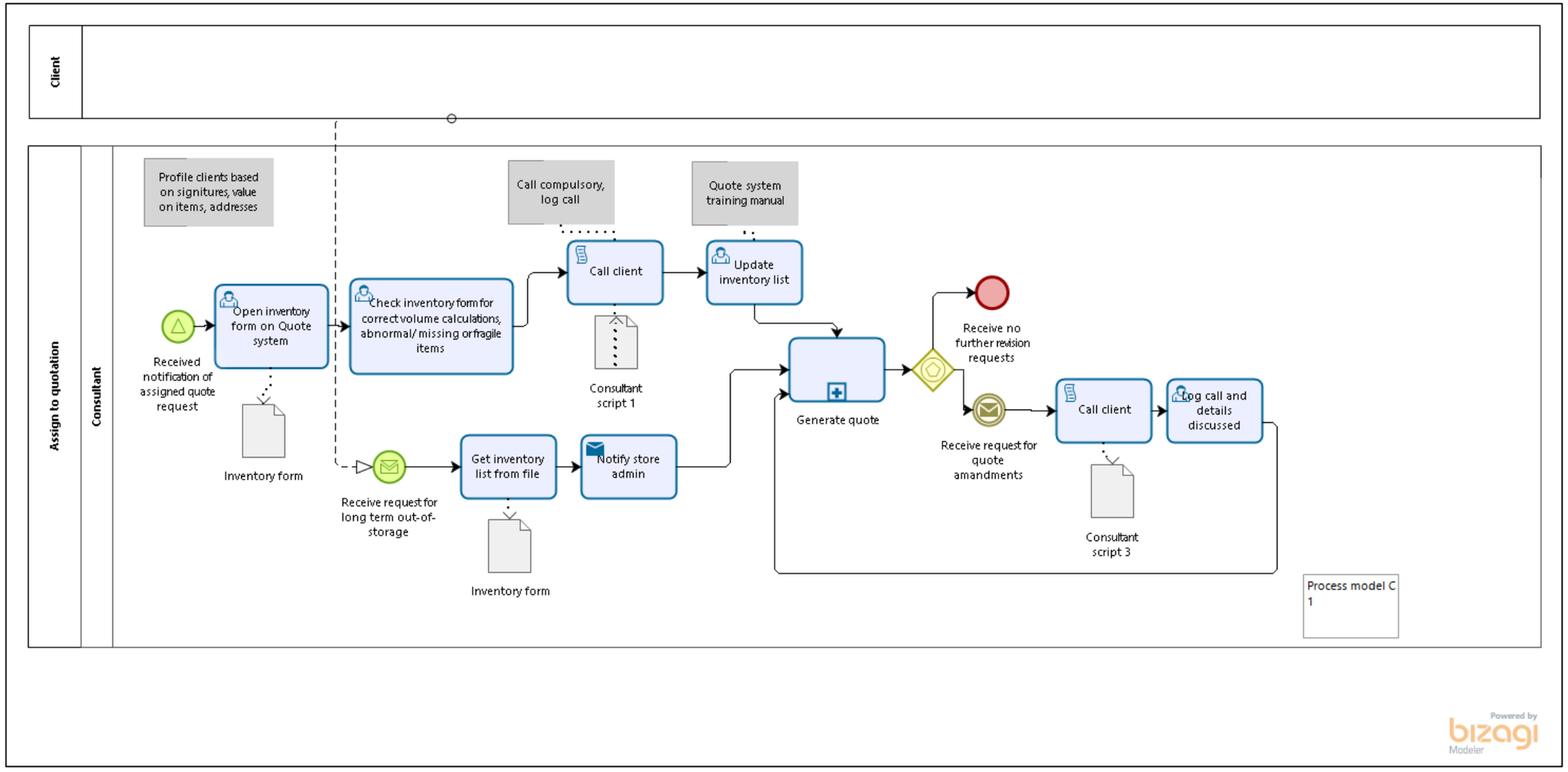


Figure 75: Consultant assign to quotation process model C1

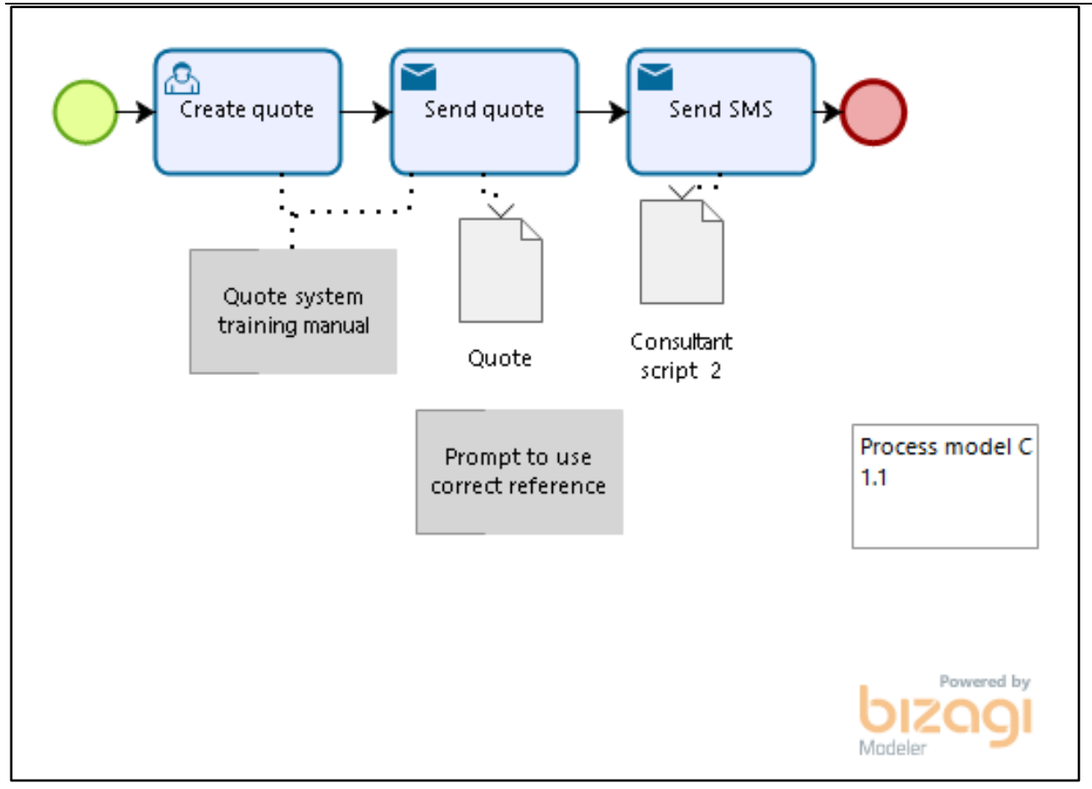


Figure 76: Consultants assign to quotation sub-process C1.1

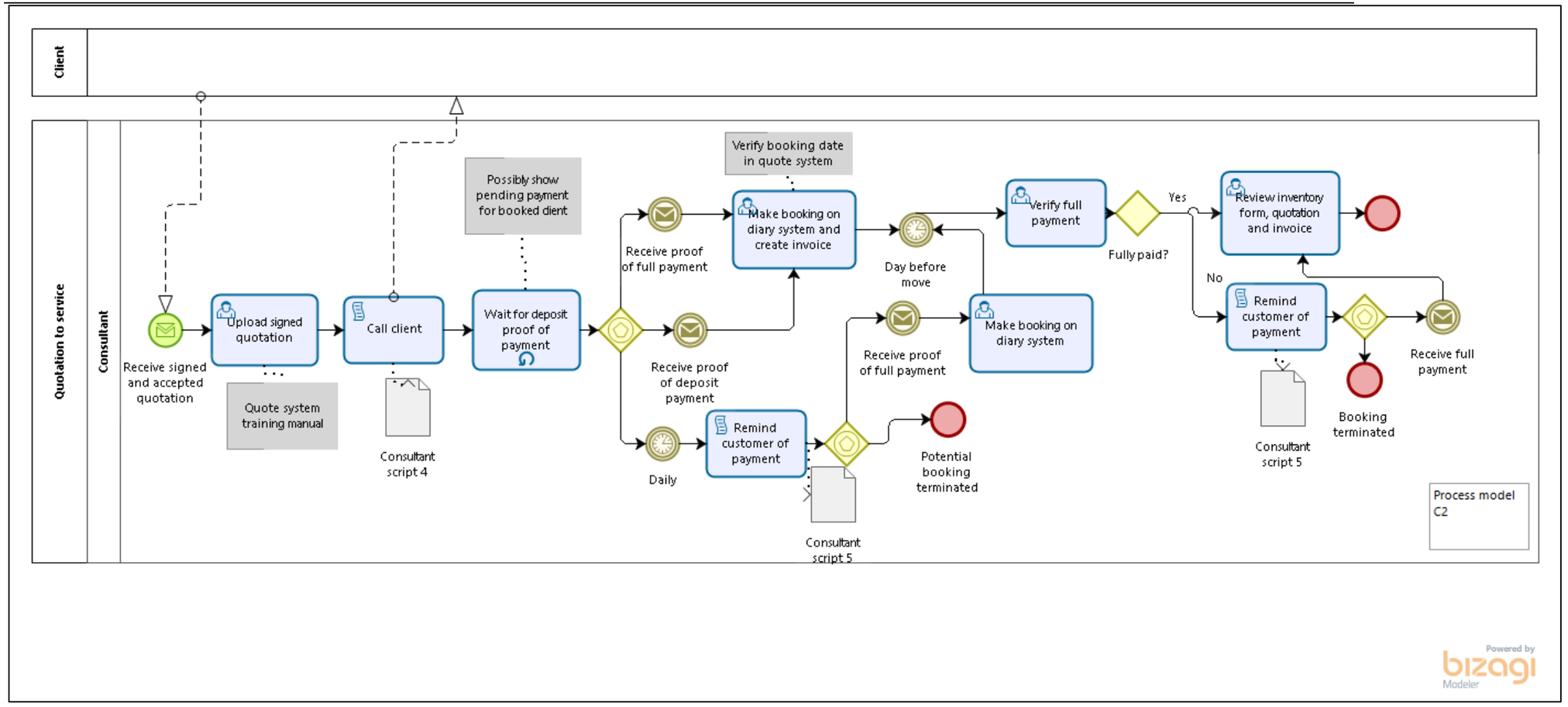


Figure 77:Consultants quotation to local service C2

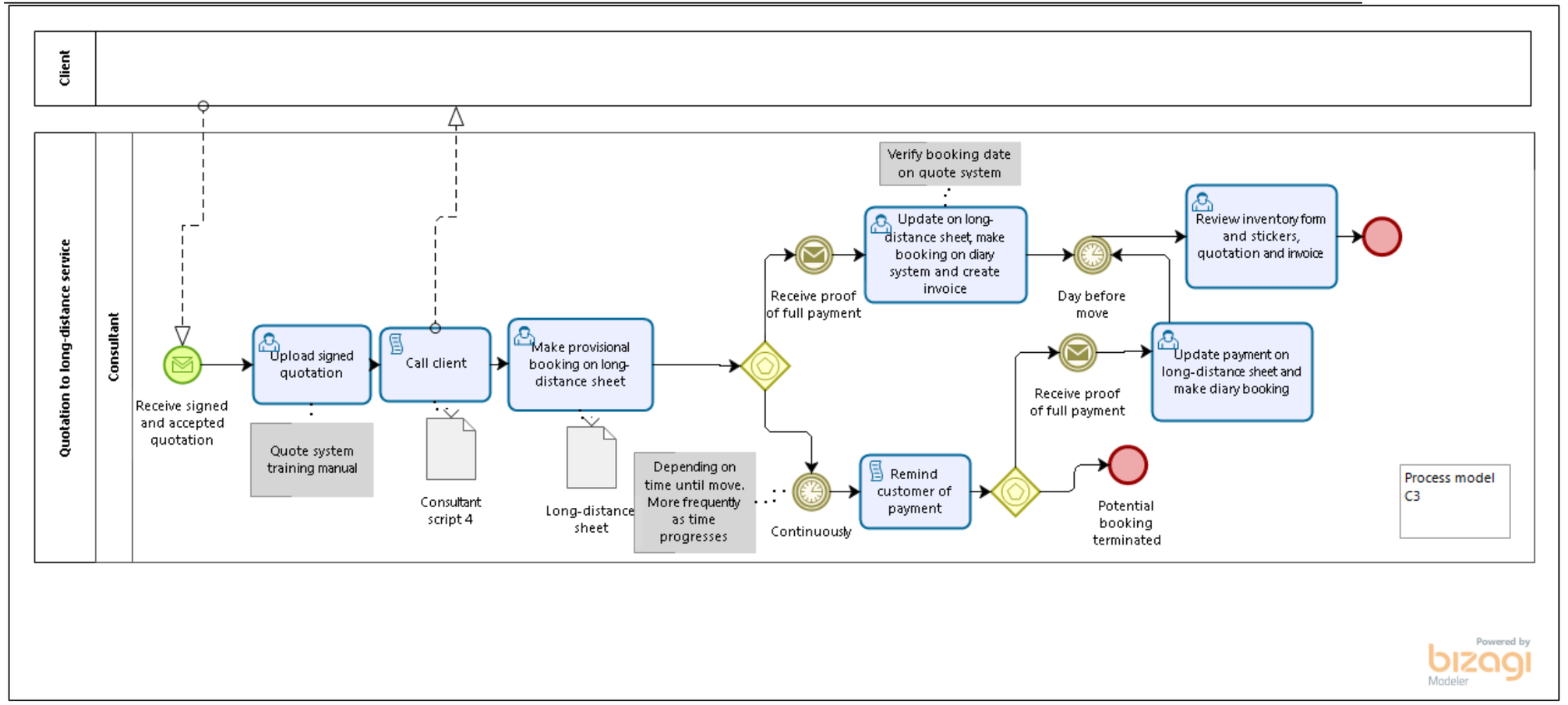


Figure 78: Consultants quotation to long-distance service C3

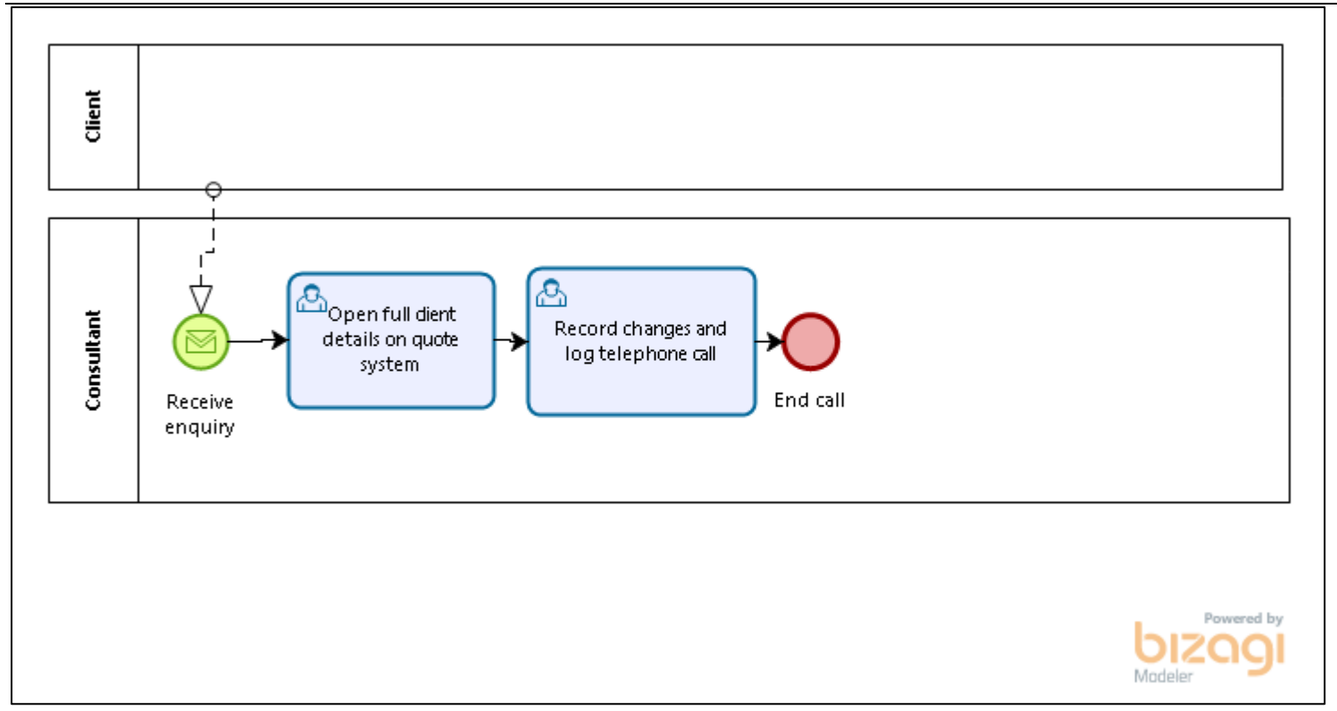


Figure 79: Consultant general enquiries

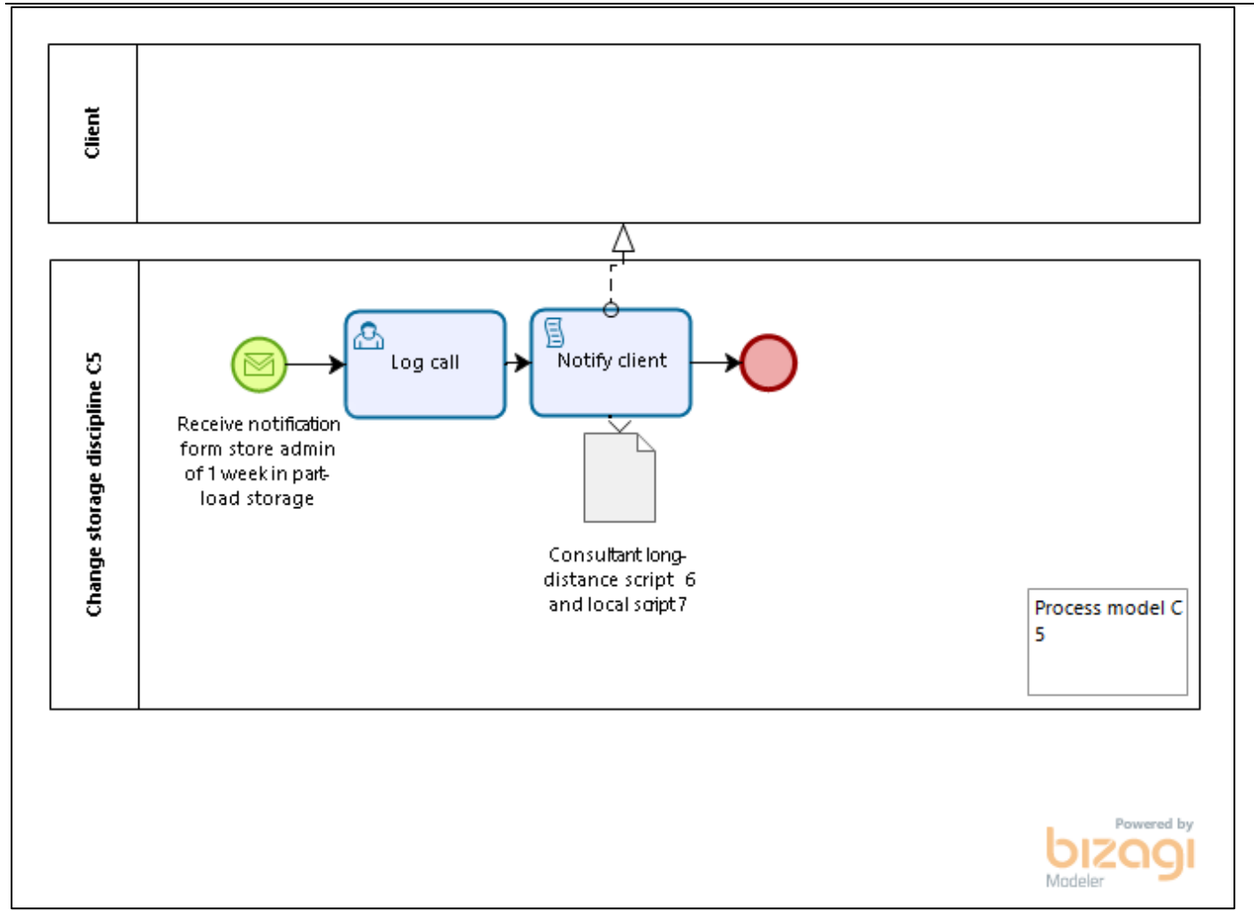


Figure 80: Consultant change storage discipline

11.9.6 Local consultant communication script

Script nr	Process model nr	Script	Reason
1	C 1	(Identify customer profile: Signatures, item values, addresses.) Good day, my name is **name** and I'm calling from Company ABC. Thank you for sending your quote request. Do you have a few minutes to discuss your quote request with me? (Record date and time before making notes on quotation system.) <u>High-value or fragile items</u> (If items are of very high value ask client if a viewing by supervisor or sales representative is necessary.) I have noticed your high-value/ fragile **items** and wanted to let you know that it is of great concern that your belongings are safeguarded throughout your move. (If applicable:) We have special crates for glass tops and mirrors packed by our experienced packers to guard your **item** against damages. We have special TV boxes for your high-value television set packed by our experienced packers to guard your television against damages. <u>Difficult items</u> I noticed that you included **item** in your inventory list. To ensure that I produce a suitable quote, I would	Make call compulsory (Before sending quote) Identify high-value, fragile, difficult, missing items on inventory list, big restrictions.

Script nr	Process model nr	Script	Reason
		appreciate some further detail on the item of concern. Would a team of three men be able to carry the **item**? (Gather detail on difficult items to ensure that it will be possible to move and how. Including number of team members, if it fits in a truck, etc.) <u>Restrictions</u> I noticed that you specified <u>restriction</u> in your quote request. To ensure that I produce a suitable quote, I would appreciate some further detail on the restriction of concern. Or I noticed that you did not include any restrictions in your quote request. The restrictions are significant to us to understand our team and truck's accessibility to your address. Would a truck have any difficulty reaching your **building** because of a height or weight restriction or a steep driveway? Are there any lifts or stairs that your furniture might have to be carried down from? <u>Missing items</u> After examining your quote request, I wanted to verify whether your inventory list is complete. (Discus missing item: e.g., table without chairs, big house with no garage inventory like lawnmowers and wheelbarrows, big house with few or no boxes, etc.) I am going to prepare a comprehensive quote. Kindly	

Script nr	Process model nr	Script	Reason
		be advised that our quotations include prices for all extra services rendered. Please check your junk mail folder for the quotation.	
2	C 1	You have received your requested quotation from Company ABC. Please check your e-mail and Junk mail inboxes. To confirm the booking, please sign the quotation and pay the deposit as indicated on the quotation. For further enquiries contact **consultant name** at name@companyabc.co.za or call 0861 456 666.	SMS Verify that client received quotation and explain quotation.
3	C 1	Good day, my name is **name** and I am calling from Company ABC. I would like to discuss the revision of your quote. (Try to find out why the client wants to revise. If the client is concerned with price, try to assist by cutting costs. Examples are: moving date to mid-month, moving only big furniture, etc.)	Call compulsory Revised quotations
4	C 2	Good day, my name is **name** and I'm calling from Company ABC. Thank you for sending your quote acceptance. Do you have a few minutes to discuss your quote with me? (Record date and time before making notes on quotation system.) High-value or fragile items (Look for any high-value or fragile items that you might have missed and make recommendations regarding appropriate packing.) To guard against any damages we only use double wall	Call after quote acceptance NB! Missing/ valuable/ fragile items? No boxes Wrapping Restrictions

Script nr	Process model nr	Script	Reason
		boxes for packing and we advise our clients to do the same. We do offer professional packing and wrapping services to our clients, as well as delivery of packing materials for our clients who wish to do their own packing. After you move, our experienced packers can also unpack your boxes. Can I interest you in some of these services? <u>Restrictions</u> I would like to verify the restrictions at your specified addresses. The restrictions are significant to us to understand our team and truck's accessibility to your address. Would a truck have any difficulty reaching your **building** because of a height or weight restriction or a steep driveway? Are there any lifts or stairs that your furniture might have to be carried down from? Regarding the time of your moves, are there any restrictions on the time for the move?	
5	C 2	Good day, my name is **name** and I am calling from Company ABC. I am calling with regards to the quotation you accepted. Before I can make your booking, I need to receive the deposit as indicated on the quote.	Payment reminder
6		Good day, my name is **name** and I am calling from Company ABC. I am calling with regards to your move today. Our vehicle has unfortunately run into some trouble on its way to you/preceding client. We have a mechanic and a back-up vehicle on its way and will let you know as soon as we have an update. We apologise for any inconvenience caused.	Notify client on truck progress

Script nr	Process model nr	Script	Reason
		(Call customer with updates) Good day, my name is **name** and I am calling from Company ABC. I am calling with regards to our vehicle's progress.	
7	C 5	Good day, my name is **name** and I am calling from Company ABC. I am calling with regards to your belongings in our storage facility. During the quotation phase, you specified that this load would be short term. Your load has been in our short-term storage for one week and I would like to notify you that your load will be moved to the permanent storage, should you not organise for its delivery or pickup during the next week. Would you like to book a delivery with us?	Change storage discipline. 1 week after booking into part load

General comments

Call during lunch time

Standard documentation and e-mails

Quotation e-mail

Quotation follow-up e-mail

11.9.7 Long-distance consultant communication script

Script nr	Process model nr	Script	Reason
1	C 1	(Identify customer profile: Signatures, item values, addresses.) Good day, my name is **name** and I'm calling from Company ABC. Thank you for sending your quote request. Do you have a few minutes to discuss your quote request with me? (Record date and time before making notes on quotation system.) <u>High-value or fragile items</u> (If items are of very high value ask client if a viewing by supervisor or sales representative is necessary.) I have noticed your high-value/ fragile **items** and wanted to let you know that it is of great concern that your belongings are safeguarded throughout your move. (If applicable:) We have special crates for glass tops and mirrors packed by our experienced packers to guard your **item** against damages. We have special TV boxes for your high-value television set packed by our experienced packers to guard your television against damages. <u>Difficult items</u>	Make call compulsory (Before sending quote) Identify high-value, fragile, difficult, missing items on inventory list, big restrictions.

Script nr	Process model nr	Script	Reason
		I noticed that you included **item** in your inventory list. To ensure that I produce a suitable quote, I would appreciate some further detail on the item of concern. Would a team of three men be able to carry the **item**? (Gather detail on difficult items to ensure that it will be possible to move and how. Including number of team members, if it fits in a truck, etc.) <u>Restrictions</u> I noticed that you specified <u>restriction</u> in your quote request. To ensure that I produce a suitable quote, I would appreciate some further detail on the restriction of concern. Or I noticed that you did not include any restrictions in your quote request. The restrictions are significant to us to understand our team and truck's accessibility to your address. Would a truck have any difficulty reaching your **building** because of a height or weight restriction or a steep driveway? Are there any lifts or stairs that your furniture might have to be carried down from? <u>Missing items</u> After examining your quote request, I wanted to verify whether your inventory	

Script nr	Process model nr	Script	Reason
		list is complete. (Discus missing item: e.g., table without chairs, big house with no garage inventory like lawnmowers and wheelbarrows, big house with few or no boxes, etc.) I am going to prepare a comprehensive quote. Kindly be advised that our quotations include prices for all extra services rendered. Please check your junk mail folder for the quotation.	
2	C 1	You have received your requested quotation from Company ABC. Please check your e-mail and Junk mail inboxes. To confirm the booking, please sign the quotation and pay the deposit as indicated on the quotation. For further enquiries contact **consultant name** at name@companyabc.co.za or call 0861 456 666.	SMS Verify that client received quotation and explain quotation.
3	C 1	Good day, my name is **name** and I am calling from Company ABC. I would like to discuss the revision of your quote. (Try to find out why the client wants to revise. If the client is concerned with price, try to assist by cutting costs. Examples are: moving date to mid-month, moving only big furniture, etc.)	Revised quotations
4	C 3	Good day, my name is **name** and I'm calling from Company ABC. Thank you for sending your quote acceptance.	Call after quote acceptance NB!

Script nr	Process model nr	Script	Reason
		Do you have a few minutes to discuss your quote with me? (Record date and time before making notes on quotation system.) <u>High-value or fragile items</u> (Look for any high-value or fragile items that you might have missed and make recommendations regarding appropriate packing.) To guard against any damages we only use double wall boxes for packing and we advise our clients to do the same. We do offer professional packing and wrapping services to our clients, as well as delivery of packing materials for our clients who wish to do their own packing. After you move, our experienced packers can also unpack your boxes. Can I interest you in some of these services? <u>Restrictions</u> I would like to verify the restrictions at your specified addresses. The restrictions are significant to us to understand our team and truck's accessibility to your address. Would a truck have any difficulty reaching your **building** because of a height or weight restriction or a steep driveway? Are there any lifts or stairs that your furniture might have to be carried down from? Regarding the time of your moves, are there any restrictions on the time for the	Missing/ valuable/ fragile items? No boxes Wrapping Restrictions

Script nr	Process model nr	Script	Reason
		move?	
5		Good day, my name is **name** and I am calling from Company ABC. I am calling with regards to your move today. Our vehicle has unfortunately run into some trouble on its way to you/preceding client. We have a mechanic and a back-up vehicle on its way and will let you know as soon as we have an update. We apologise for any inconvenience caused. (Call customer with updates) Good day, my name is **name** and I am calling from Company ABC. I am calling with regards to our vehicle's progress.	Notify client on truck progress
6	C 5	Good day, my name is **name** and I am calling from Company ABC. I am calling with regards to your belongings in our storage facility. During the quotation phase you specified that this load would be short term. Your load has been in our short-term storage for one week and I would like to notify you that your load will be moved to the permanent storage, should you not organise for its delivery or pickup during the next week. Would you like to book a delivery with us?	Change storage discipline. 1 week after booking into part load.

Standard documentation and e-mails

Quotation e-mail

Quotation follow-up e-mail

11.9.8 Consultant role description

1. Role

This role: Consultant

Reports to:Logistics manager

2. Purpose

To serve the customer by accurate telephonic/ electronic data gathering in terms of inventory, address and other move-related information and expert advice. Providing an accurate quote while maximizing revenue and customer satisfaction.

3. Key performance areas

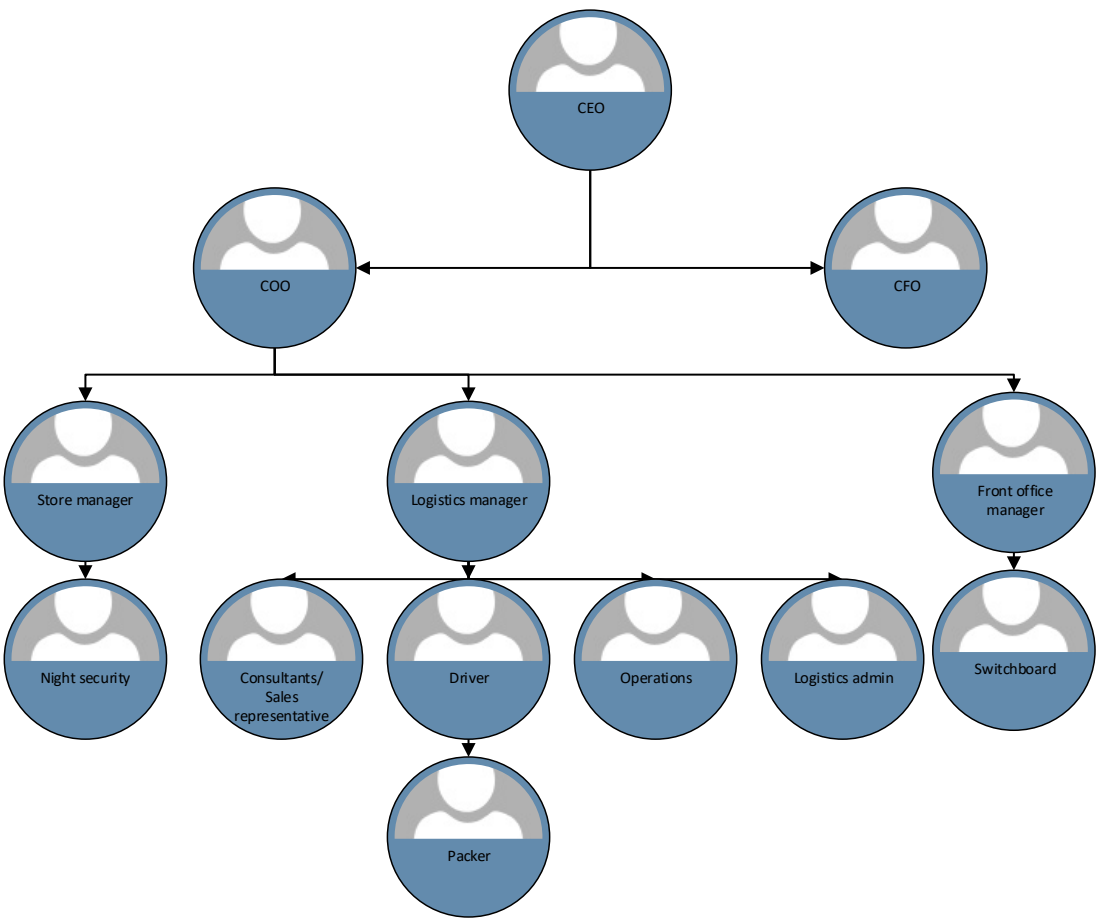
3.1 KPA 1 Swift quote and query response

3.2 KPA 2 Sales revenue (transport, storage and packing/wrapping)

3.3 KPA 3 Generating accurate quote

3.4 KPA 4 Prepared move

4. Organisational structure



5. Role

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Respond to assigned quote enquiries and existing client enquiries.	- Process model C 1 and C 4
KPA 2	- Sell and promote services offered by Company ABC.	- Process model C 1 and C 2
KPA 3	- Generate accurate quotes.	- Process model C 1.1
KPA 4	- Make booking and ensure all information is complete before logistics manager follows-up.	- Process model C 2 and C 3

6. Deliverables

	Deliverable	Before	Format
Daily	Completed bookings	Service date	Diary
Monthly	Sales figures	Month end	Spreadsheet

7. Skills and Education

KPA	Skill
Swift quote and query response	1. Sufficient telephonic communication skills 2. Training on quotation system
Sales revenue	1. Sufficient telephonic communication skills 2. Good promotional skills 3. Pastel
Accurate quote	1. Training on quotation system 2. Knowledge on typically challenging items/ situations
Prepared move	1. Knowledge on typically challenging items/ situations

8. Competencies (Internal)

Competency	Level
Basic Training	Do
Consultant Training	Do
Service and Maintenance	Informed
Transport and Logistics	Do
Procurement	Informed
Customer Satisfaction, Communication and Telephonic Selling	Do

9. Measures of success

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Monthly sales revenue (Will differ between consultants. Focus on additional services)	N/A	N/A	N/A	N//A	N/A
Monthly number of complaints	5	4	2	1	0
Number of revised quotes	5	4	3	1	0
Quotation response time	120 min	90 min	60 min	30 min	15 min

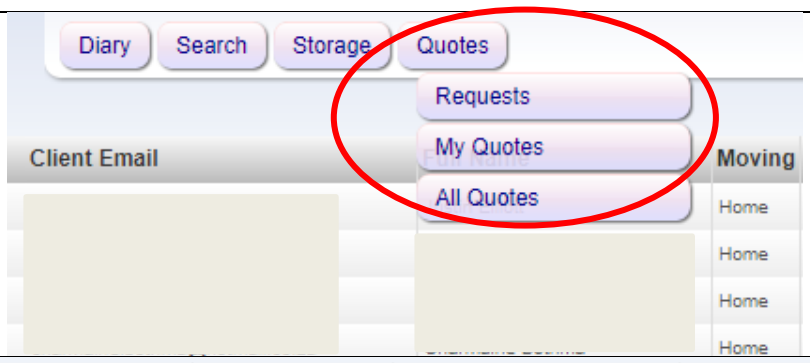
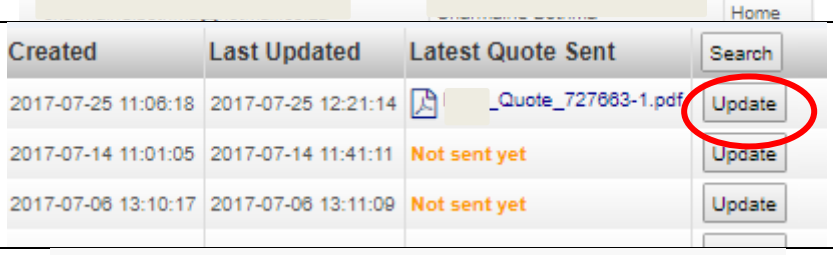
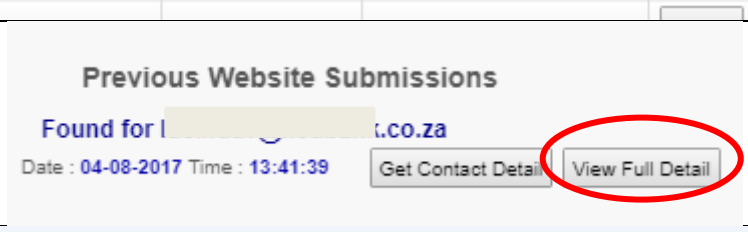
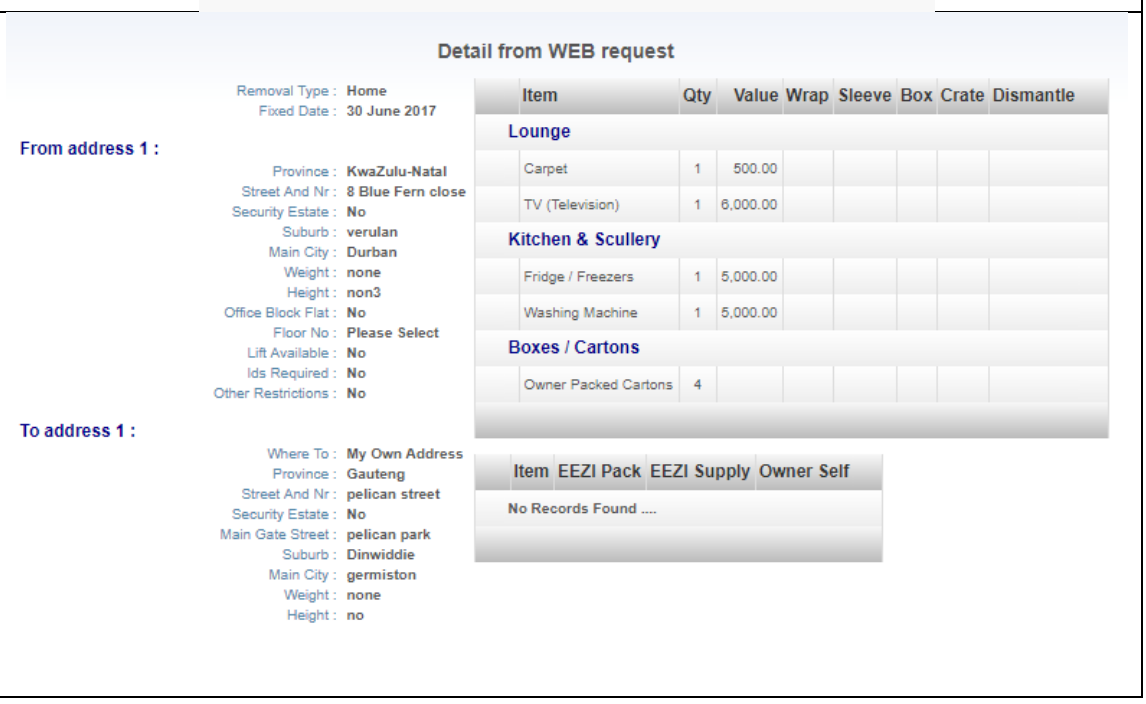
10. Incentive

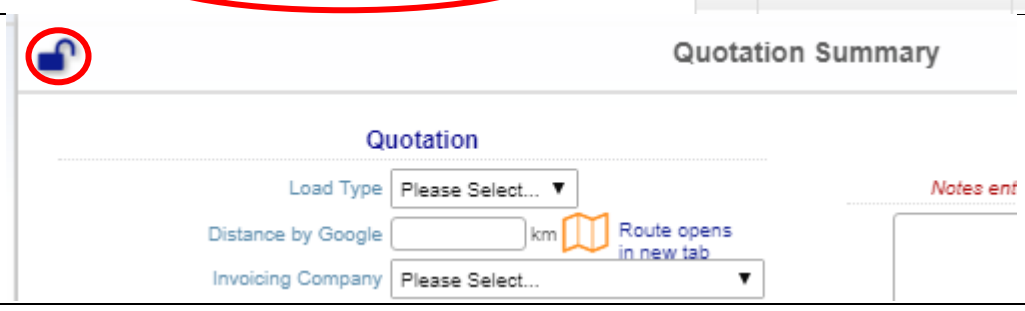
Commission on personal monthly sales revenue.

11.9.9 Consultant training manual

Roles concerned	Consultants
	Sales representatives
Process models involved	C1
	C2
	C3
	C4

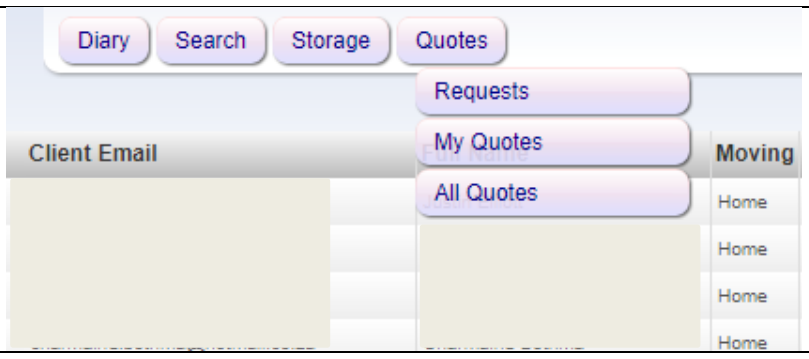
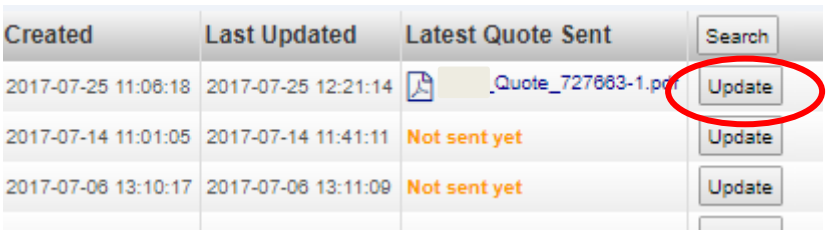
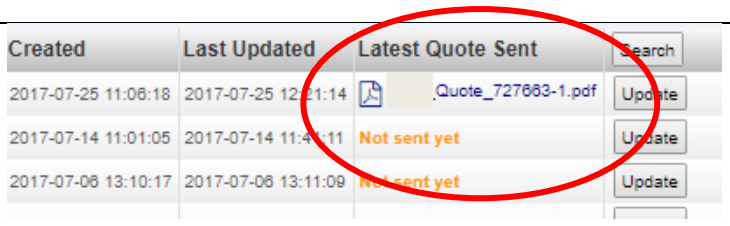
11.9.9.1 Basic screens

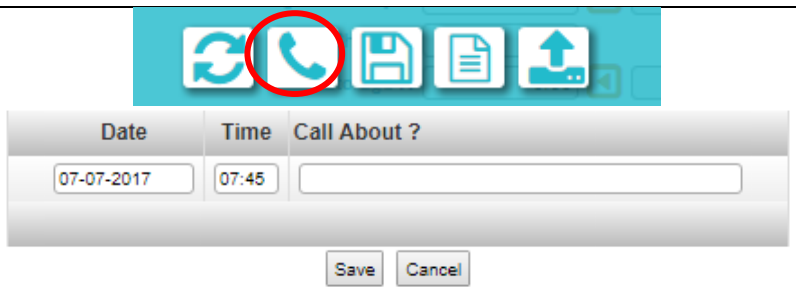
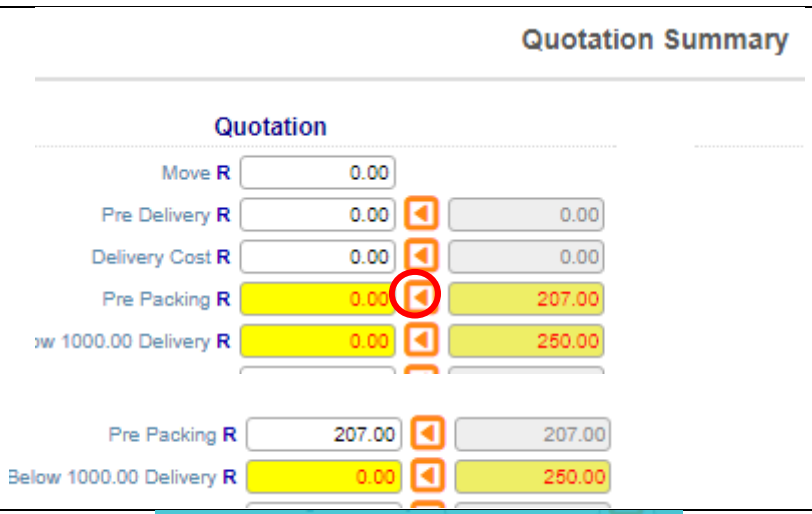
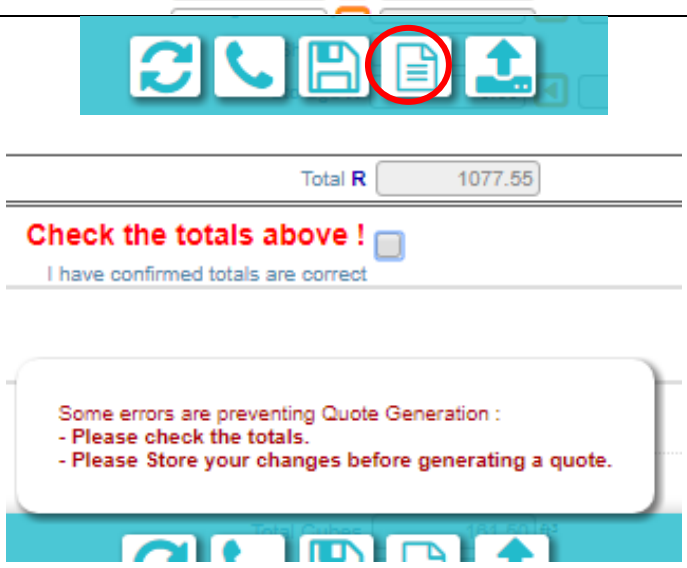
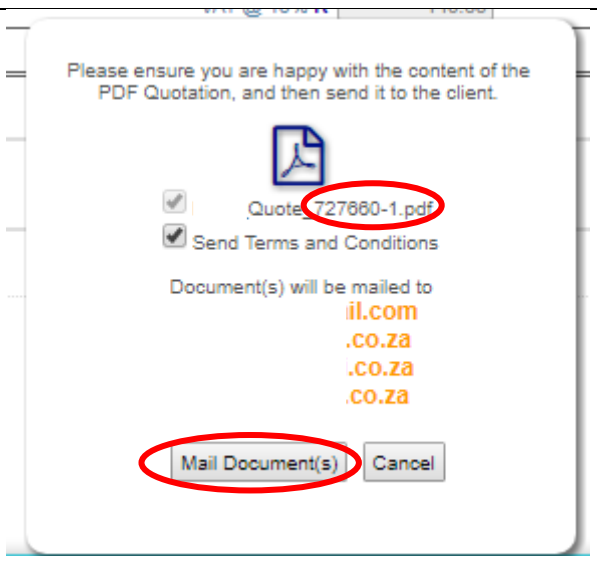
Explanation	Screen shot
All customers assigned to a consultant are listed in Quotes>> My Quotes/ All quotes	
To view client-specific detail, go to "Update."	
To view a summary of the client details, select "View full detail."	
View full detail	

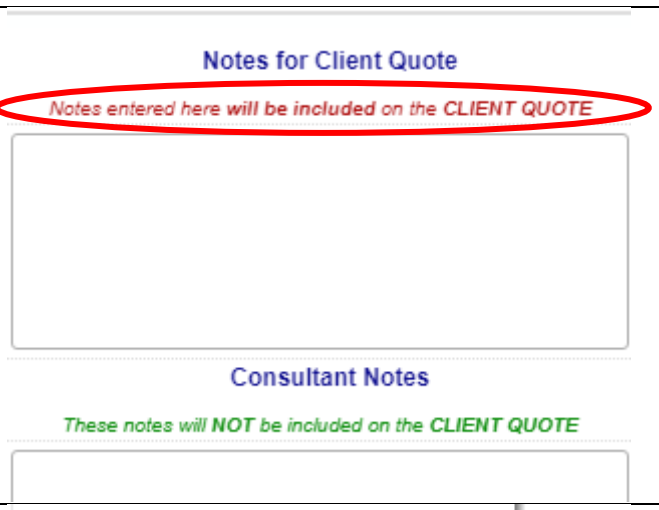
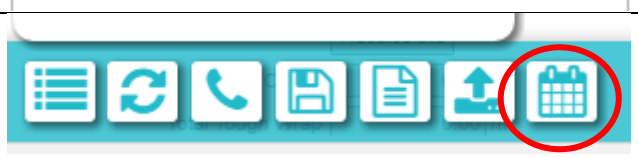
Explanation	Screen shot
To make amendments to details, setup inventory at the bottom of the screen.	
To fix summary quotation on screen, select the lock.	

11.9.9.2 Consultants Assign to Quotation (C1)

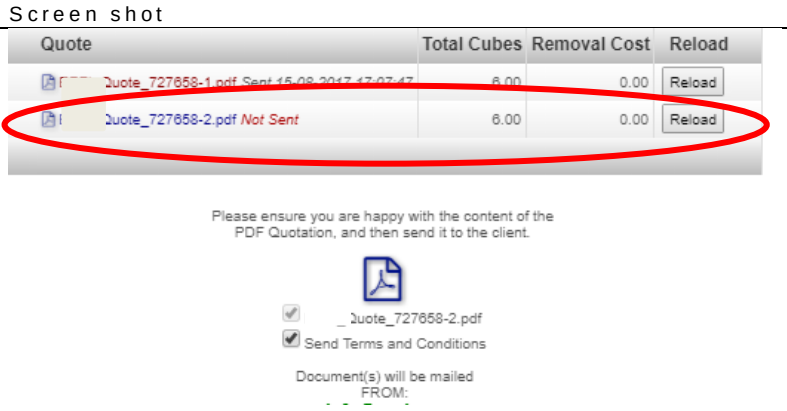
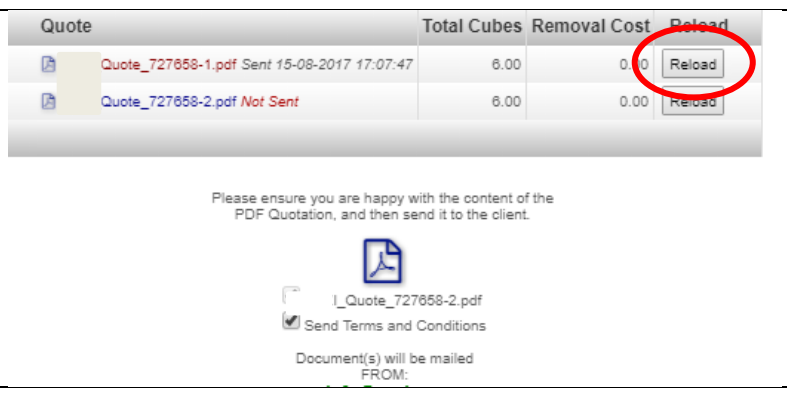
11.9.9.2.1 Receive client and generate quotation

Step	Explanation	Screen shot
1	Once a quote request is assigned to a consultant, the quote request appears under "All quotes" and "My quotes" for the specific consultant.	
2	Under "All quotes" there is a list of assigned quotes and the relevant consultant. To update the contact details or inventory list, select the "Update" button to the far right. In "My Quotes," all quotes assigned to a specific consultant are available.	
3	The status of client is visible in "My Quotes" and "All Quotes"	

Step	Explanation	Screen shot
4	When making calls to a client, log the phone call and all details on the system. To log a phone call, select the "log telephone call" button at the bottom of the screen.	
5	Under quotation summary, discrepancies are indicated with yellow highlights. Where pre-packing and delivery was required, the rand values show discrepancies. To eliminate discrepancies, select the orange arrow.	
6	To generate a quote for the inventory list, select the "Generate quote" button at the bottom of the list. If a warning screen pops up, select the tick box that reads "I have confirmed that the totals are correct" and save the list by selecting the "Save" button at the bottom of the screen. Then select "Generate Quote" again.	
7	A popup will appear. Ensure that you are satisfied with the quote and the recipients of the quote. Once you are satisfied, select the "Mail Document(s)" button. The "-1" in the quote name means that this is the first version of the quote. Once a new quote is generated, the new quote is named with a "-2."	
8	A quote summary will also appear at the top of the screen.	

Step	Explanation	Screen shot
9	To insert a note that should appear on the quote, use block in "Quote summary."	
10	To add to diary after quote acceptance, select "Add to diary" at bottom of the screen.	

11.9.9.2.2 Revised quotes

Step	Explanation	Screen shot
1	Complete steps to update inventory as described before. When selecting "Generate quote," all previous quotes will appear. Select boxes for last revision and send as before.	
2	If the client wishes to return to a previous quote, select "reload" to update inventory.	

11.9.10 Sales representative process model

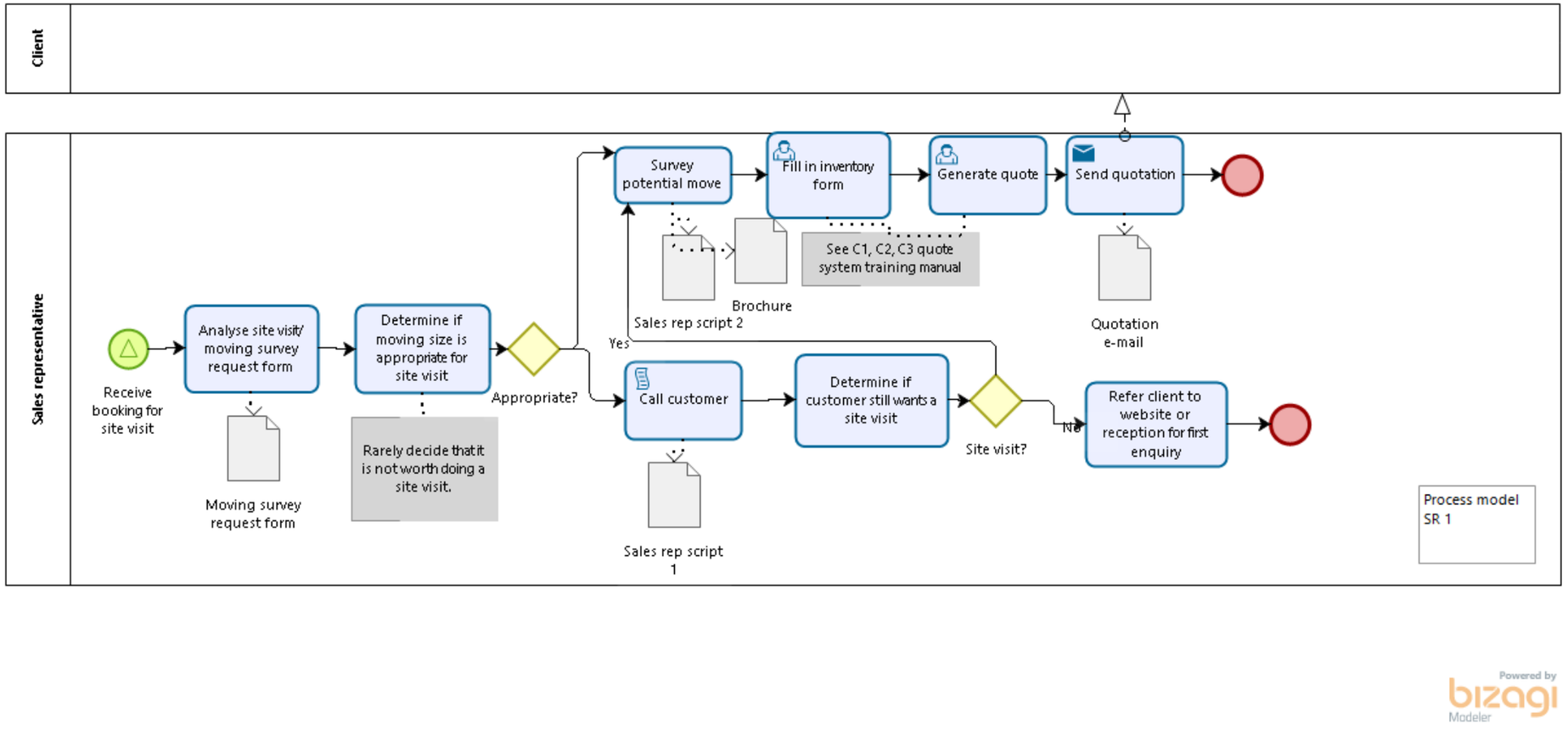


Figure 81: Sales representative process model SR1

11.9.11 Sales representative communication script

Script nr	Process model nr	Script	Reason
1	SR 1	Good day, my name is **name** and I'm calling from Company ABC. Thank you for sending your moving survey request form. Do you have a few minutes to discuss it with me? (Record date and time before making notes on quotation system.) We are two company representatives performing moving surveys in the Gauteng area. We are especially responsible for large or prominent moves. We do have the facility to cater for smaller moves using specially developed website quote request or inventory forms. Would you prefer that I still come and survey your move or do you want to be assigned to one of our experienced in-house consultants?	Determine of the site visit is necessary
2	SR 1	Introduce self and state relation to Company ABC. Let the client know that it is Company ABC's priority to safeguard his/her possessions throughout the move. Highlight the use of double wall boxes and crates regarding this matter. Encourage to use Company ABC packing services and material. Otherwise advise to secure wrapping by using strong materials	.

General comments

Especially considering the site visits/ moving surveys, it is very important that the sales representative makes a good impression on the client. The sales representative must appear professional and knowledgeable.

Standard documentation and e-mails

Quotation e-mail

11.9.12 Sales representative role description

1. **Role**

This role:Sales representative

Reports to:Logistics manager

2. **Purpose**

Serve the client by doing moving surveys on site before move to accurate generate quote while maximizing sales revenue and client satisfaction.

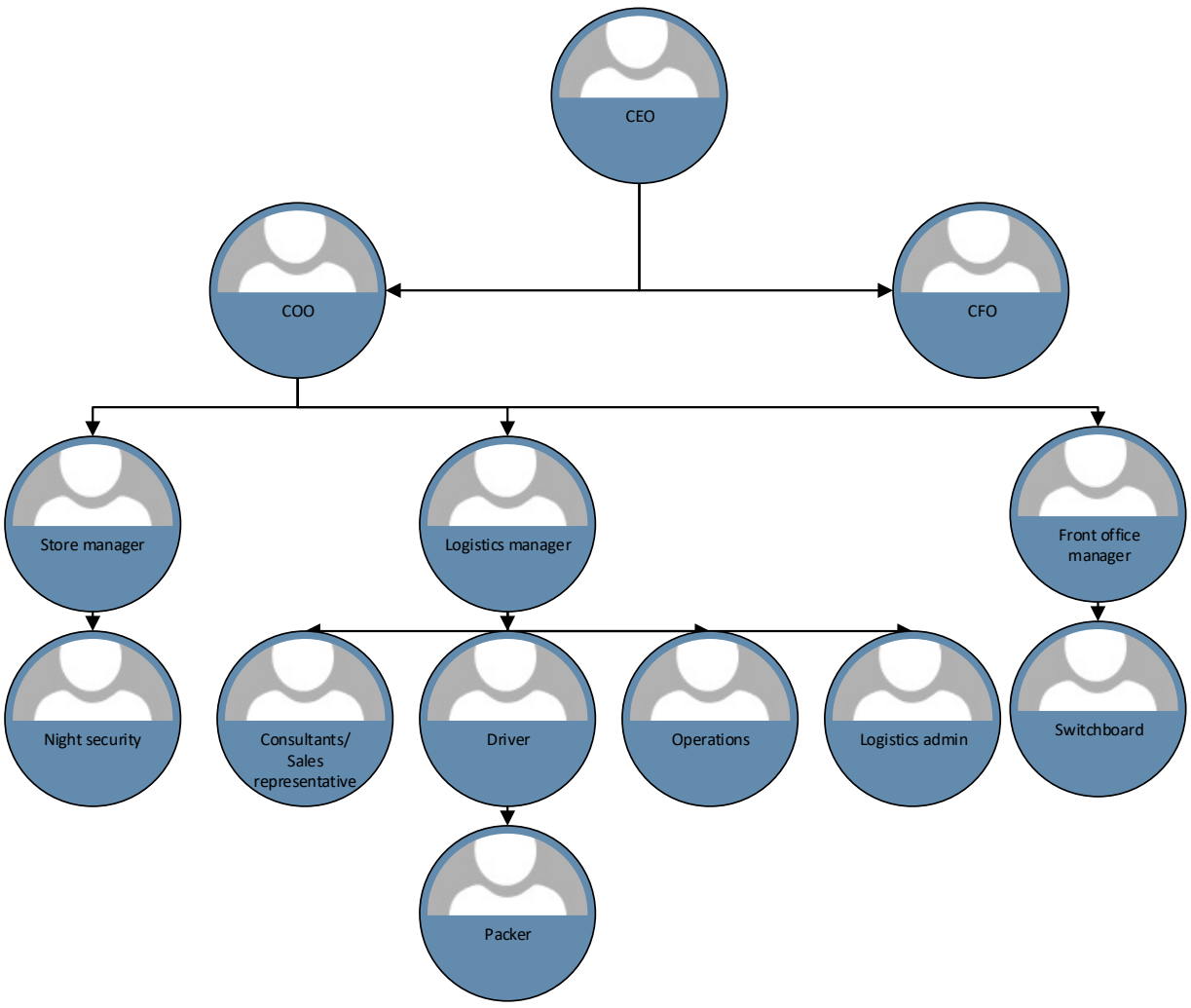
3. **Key performance areas**

3.1 KPA 1 Gathering accurate information

3.2 KPA 2 Professional client contact

3.3 KPA 3 Expert client recommendation

4. **Organisational structure**



5. **Role**

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Gather accurate information on move regarding inventory	- Process model SR 1
KPA 2	- Present professionally when in contact with client	- Process model SR 1
KPA 3	- Give expert client recommendations regarding move	- Process model SR 1

6. **Deliverables**

	Deliverables	Format	Before
Daily	Completed bookings	Diary	Day-end
Monthly	Sales data	Spread sheet	Month end

7. **Skills and Education**

KPA	Skill
Gathering accurate information	1. Observe and note all relevant information needed for move.
Professional client contact	1. Present professionally to client. 2. Good oral and visual presentation.
Expert client recommendation	1. Knowledgeable on typical challenging items/ other factors. 2. Promotional skills when recommending additional services.

8. **Competencies (Internal)**

Competency	Level
Basic Training	Do
Consultant Training	Do
Service and Maintenance	Informed
Transport and Logistics	Do
Procurement	Informed
Client Satisfaction, Communication and Telephonic Selling	Do

9. Measures of success

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Monthly sales revenue (Will differ between consultants. Focus on additional services)					
Monthly number of complaints	5	4	2	1	0
Number of revised quotes	5	4	3	1	0
Quotation response time	3 days	2 days	1 day	12 hours	6 hours

10. Incentive

Commission on personal sales revenue per month.

11.9.13 Local logistics process model

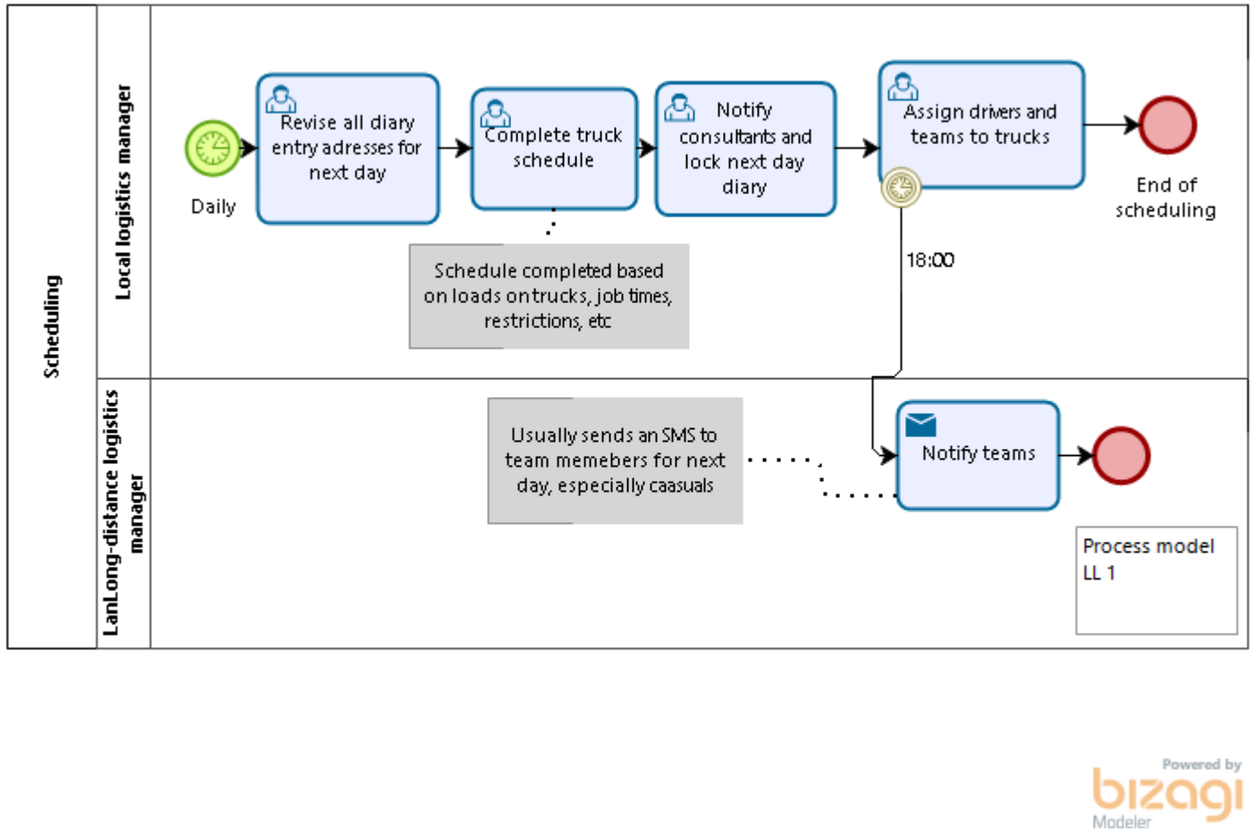


Figure 82: Local logistics scheduling LL1

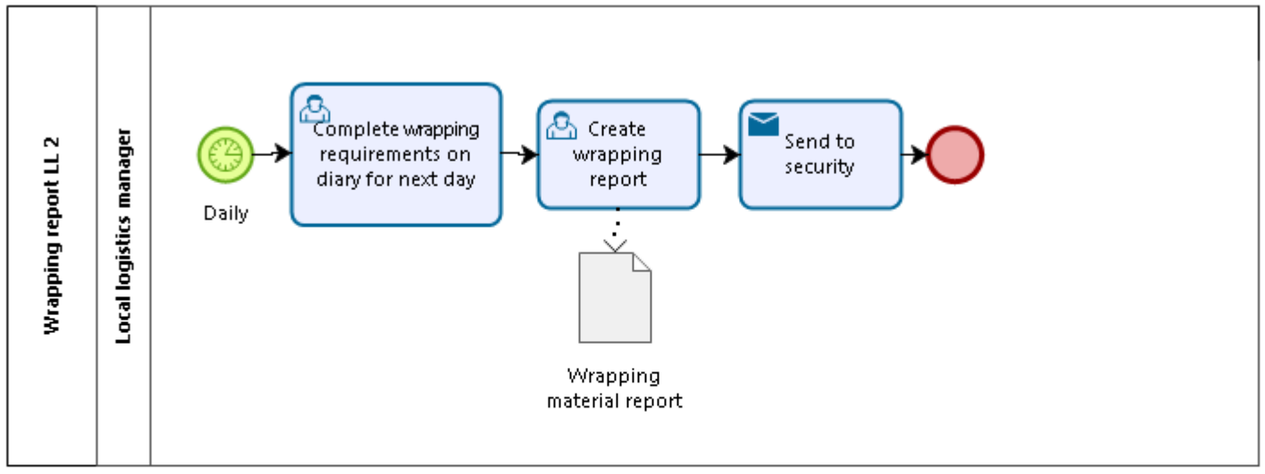


Figure 83: Local logistics wrapping report LL2

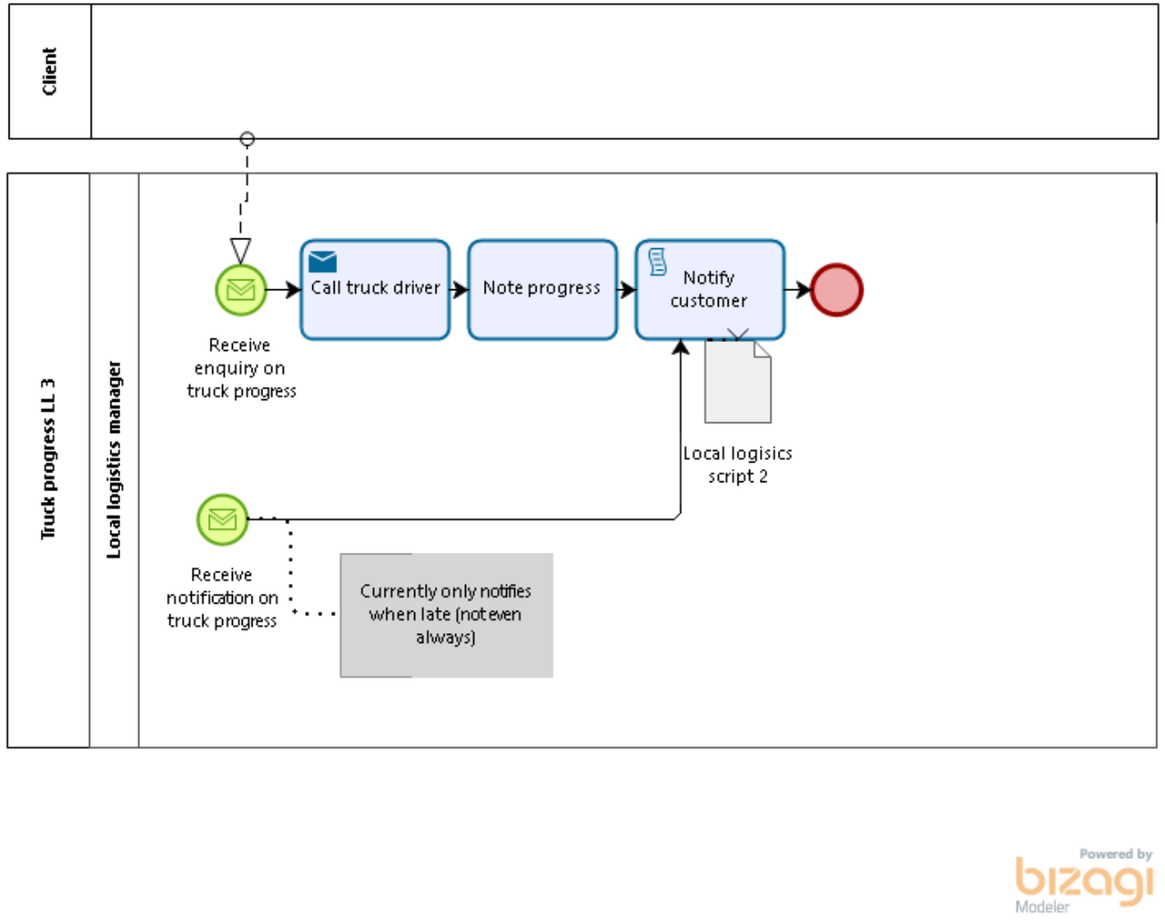


Figure 84: Local logistics truck progress LL3

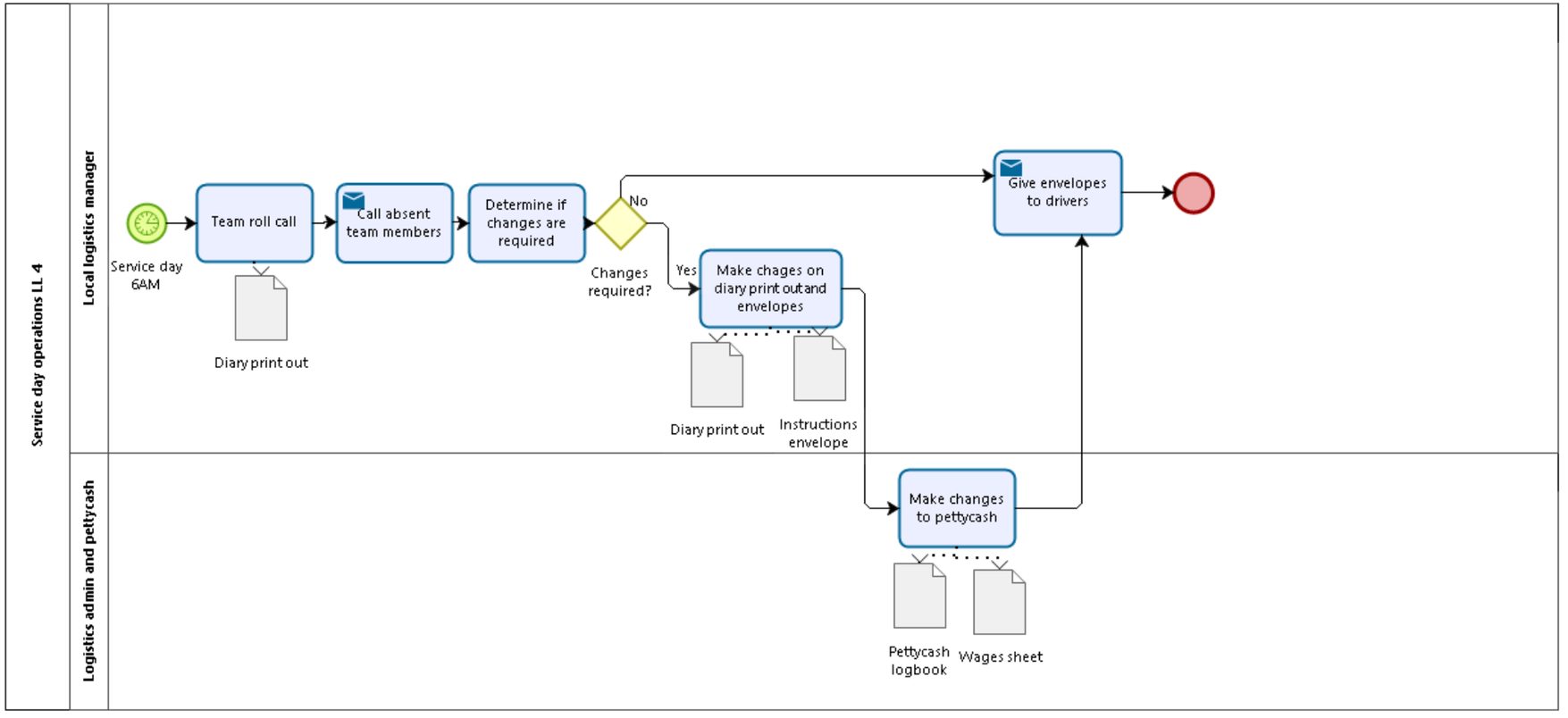


Figure 85: Local logistics service day operations LL4

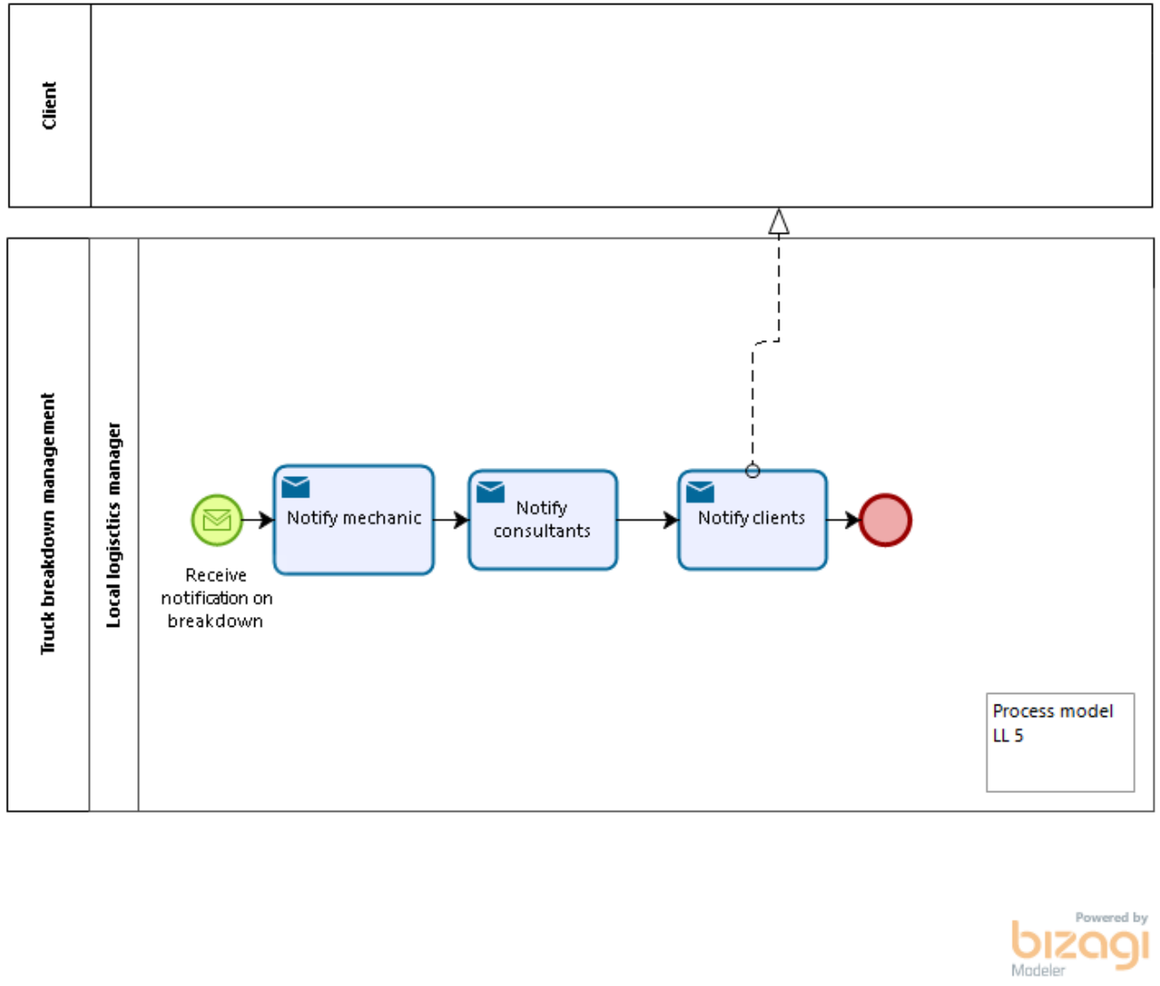


Figure 86: Local logistics truck breakdown management LL5

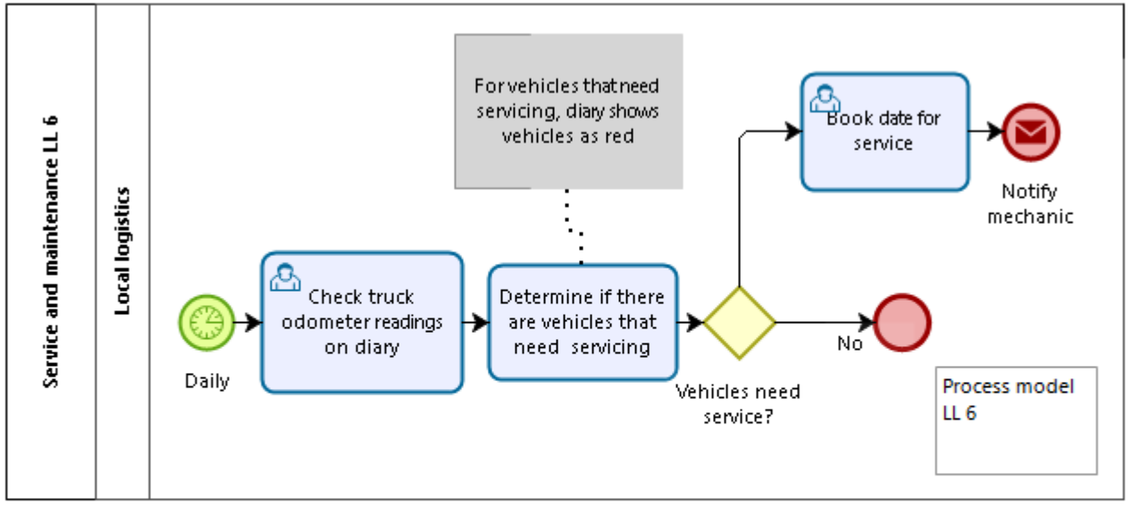


Figure 87: Local logistics service and maintenance LL6

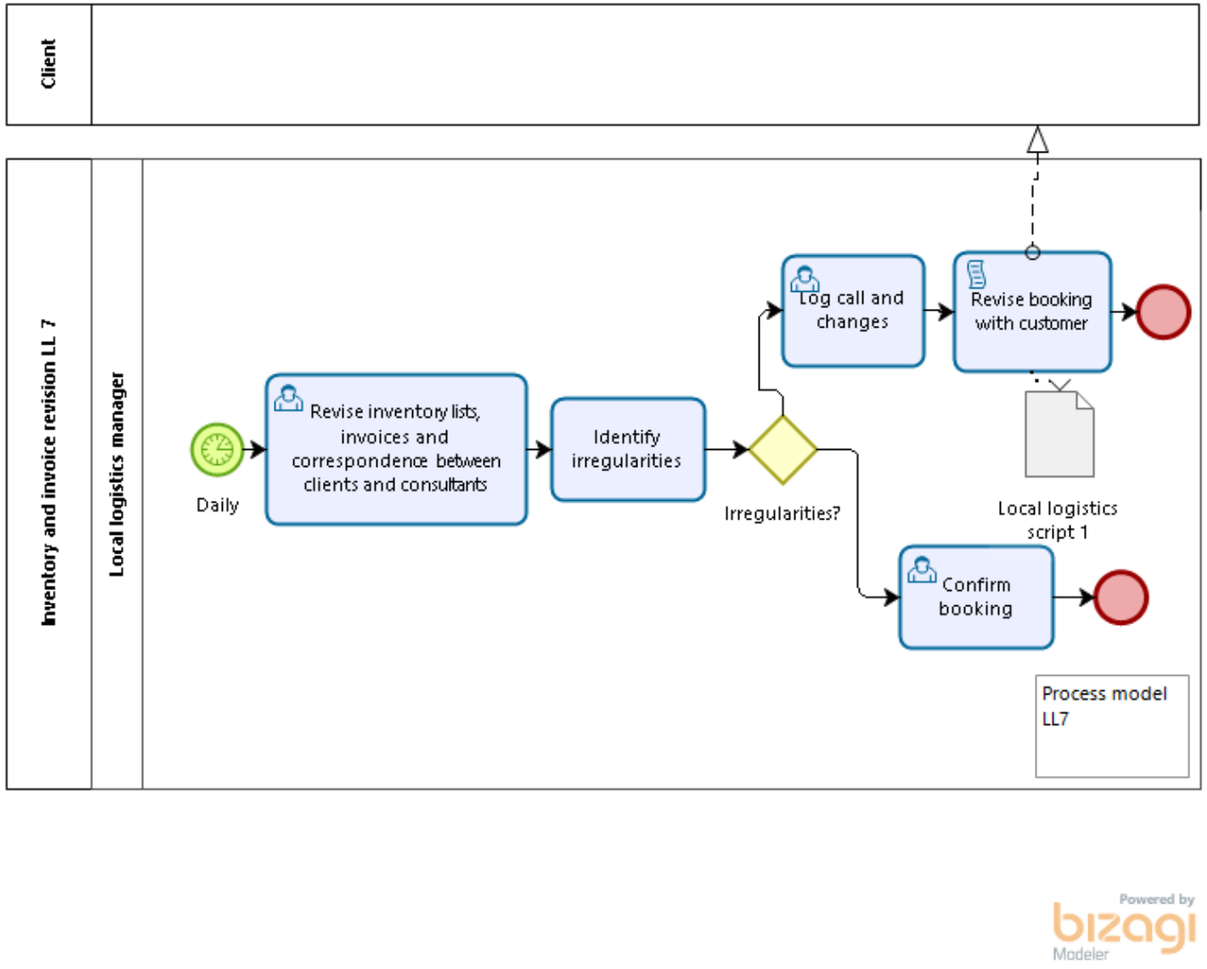


Figure 88: Local logistics inventory and invoice revision

11.9.14 Local logistics communication scripts

Script nr	Process model nr	Script	Reason
1	LL 7	Below script was taken from consultant scripts and serve as framework. (Identify customer profile: Signatures, item values, addresses.) Good day, my name is **name** and I'm calling from Company ABC. Do you have a few minutes to discuss your booking with me? (Record date and time before making notes on quotation system.) <u>High-value or fragile items</u> (If items are of very high value ask client if a viewing by supervisor or sales representative is necessary.) I have noticed your high-value/ fragile **items** and wanted to let you know that it is of great concern that your belongings are safeguarded throughout your move. (If applicable:) We have special crates for glass tops and mirrors packed by our experienced packers to guard your **item** against damages. We have special TV boxes for your high-value television set packed by our experienced packers to guard your television against damages. <u>Difficult items</u> I noticed that you included **item** in your inventory list. To ensure that I send a suitable team and vehicle, I would appreciate some further detail on the item of concern. Would a team of three men be able to carry the **item**? (Gather detail on difficult items to ensure that it will be possible to move and how. Including number of team members, if it fits in a truck, etc.) <u>Restrictions</u> I noticed that you specified <u>restriction</u> in your quote request. To ensure that I send a suitable team and vehicle, I would appreciate some further detail on the restriction of concern. Or I noticed that you did not include any restrictions in your quote request. The restrictions are significant to us to understand our team and truck's accessibility to your address. Would a truck have any difficulty reaching your **building** because of a height or weight restriction or a steep driveway? Are there any lifts or stairs that your furniture might have to be carried down from? <u>Missing items</u> After examining your quote request, I wanted to verify whether your inventory list is complete. (Discus missing item: e.g., table without chairs, big house with no garage inventory like lawnmowers and	Revise consultant inventory lists and invoices. Identify high-value, fragile, difficult, missing items on inventory list, big restrictions.

Script nr	Process model nr	Script	Reason
		wheelbarrows, big house with few or no boxes, etc.) To guard against any damages we only use double wall boxes for packing and we advise our clients to do the same. We do offer professional packing and wrapping services to our clients, as well as delivery of packing materials for our clients who wish to do their own packing. After you move, our experienced packers can also unpack your boxes. Can I interest you in some of these services?	
2	LL 3	Good day, my name is **name** and I am calling from Company ABC. I am calling with regards to your move today. Our vehicle has unfortunately run into some trouble on its way to you/preceding client. We have a mechanic and a back-up vehicle on its way and will let you know as soon as we have an update. We apologise for any inconvenience caused. (Call customer with updates) Good day, my name is **name** and I am calling from Company ABC. I am calling with regards to our vehicle's progress.	Notify client on truck progress

11.9.15 Local logistics role description

1. **Role**

   This role:Local logistics manager

   Reports to:COO

2. **Purpose**

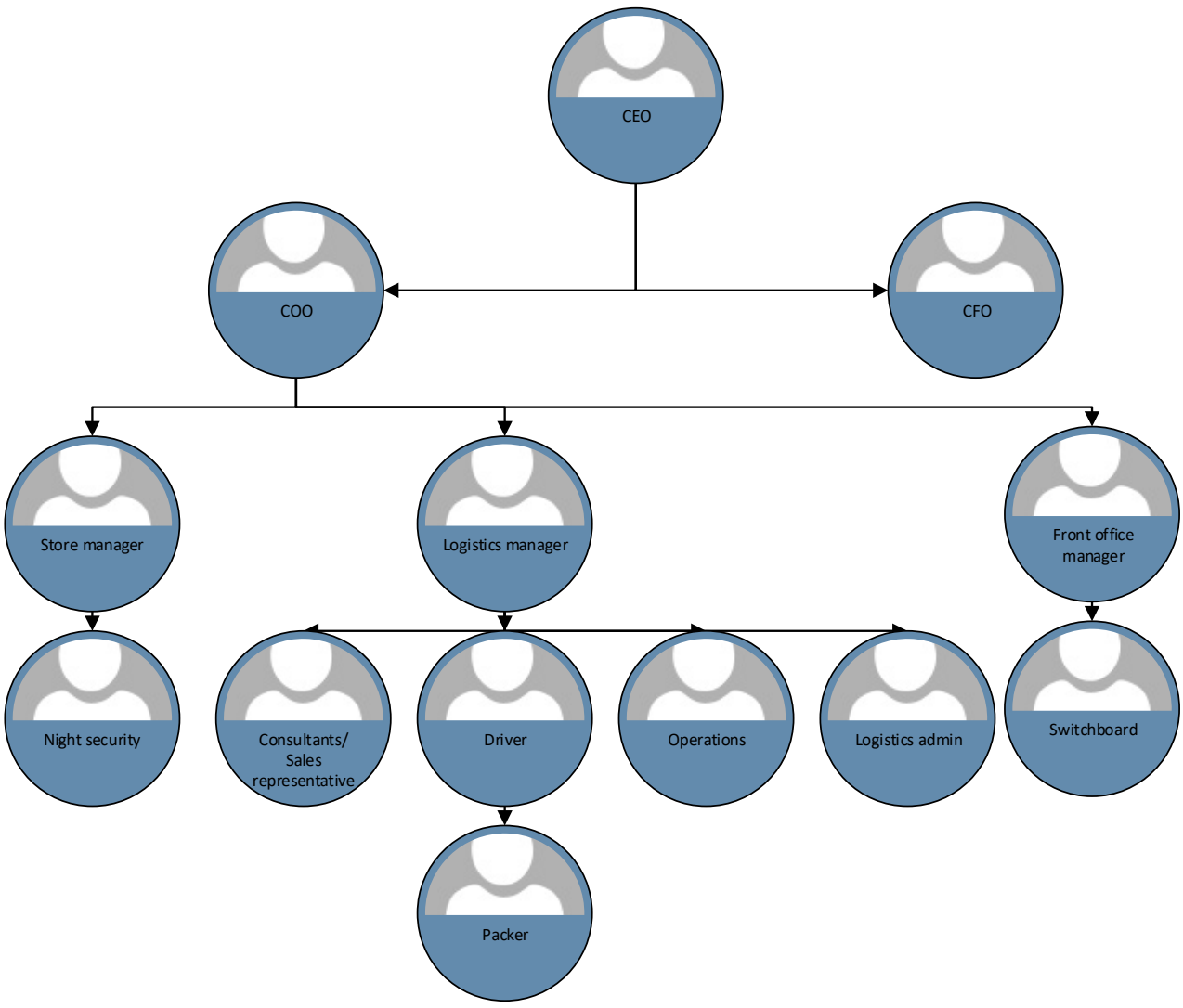
   Serve clients by coordinating local moves, consultants, vehicles and driving teams.

3. **Key performance areas**

   3.1 KPA 1 Vehicle and team scheduling

   3.2 KPA 2 Move information revision

4. **Organisational Structure**



5. Role

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Schedule moving team and vehicle for next day's moves before 14h00 confirmations	- Process model LL 1
KPA 2	- Review move information and confirm missing details with client.	- Process model LL 7, Script LL

6. Deliverables

	Deliverables	**Format**	**Before**
Daily	Schedule for local pick-ups and collections	Diary	2 PM
Monthly	Local teams time sheets	Diary	Month end

7. Skills and Education

KPA	**Skill**
Vehicle and team scheduling	1. Diary system training 2. Vehicle and team knowledge 3. Basic move knowledge 4. Basic logistics knowledge
Move information revision	1. Quote system training 2. Good telephonic communication skill 3. Knowledge on typically challenging items/ situations

8. Competencies (Internal)

Competency	**Level**
Basic Training	Teach
Consultant Training	Teach
Service and Maintenance	Do
Transport and Logistics	Do
Procurement	Informed
Customer Satisfaction, Communication and Telephonic Selling	Informed

9. Measures of success

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Efficient schedule (Revenue per volume available in truck)					
On-time arrivals (schedule deviations per week)					
Customer complaints weekly	5	4	2	1	0
Revenue (depends on month)					

10. Incentive

Local vehicles used monthly.

11.9.16 Long-distance logistics process model

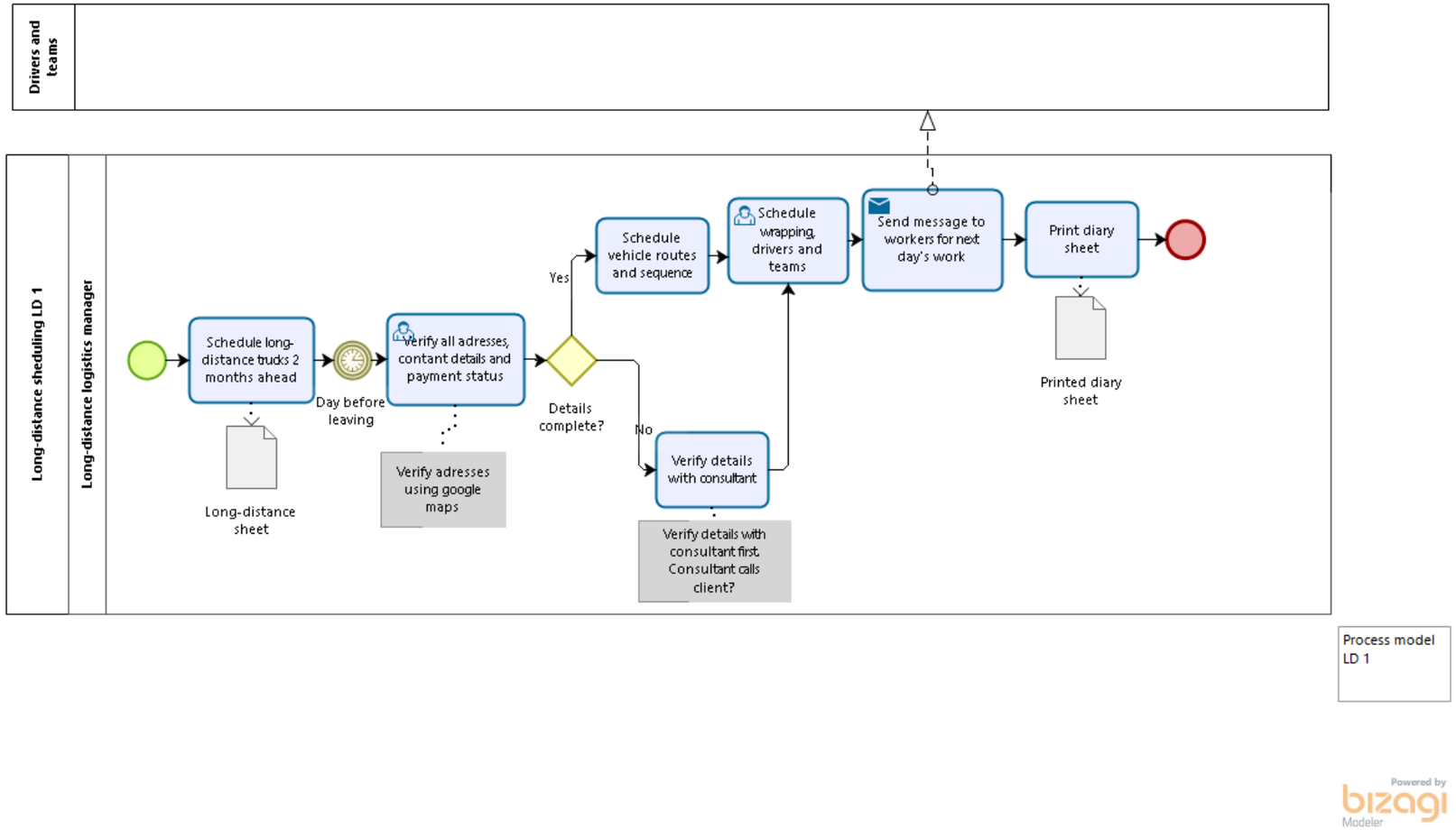


Figure 89: Long-distance logistics process model LD 1

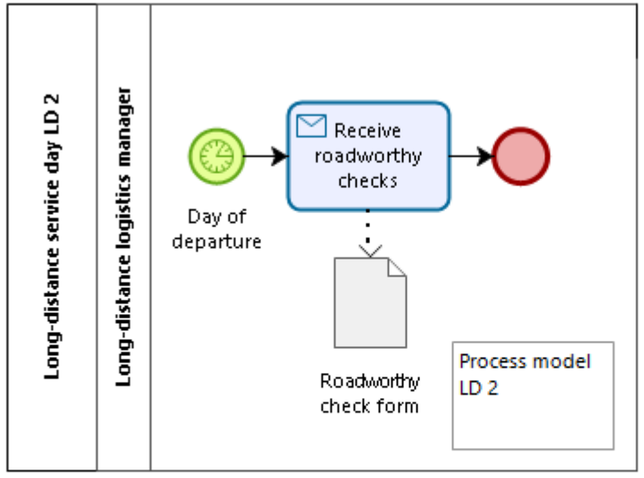


Figure 90: Long-distance service day process model LD 2

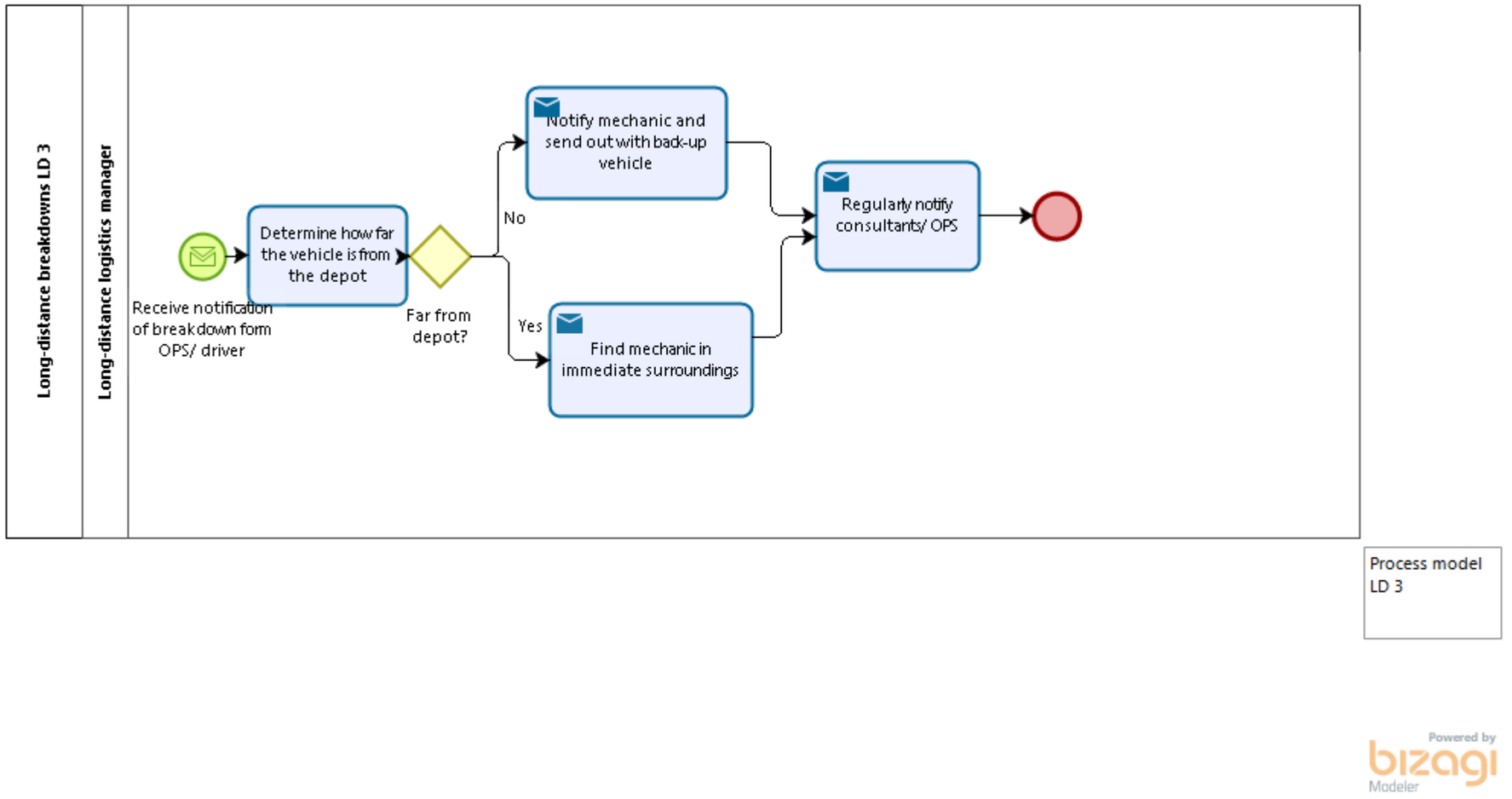


Figure 91: Long-distance breakdowns process model LD 3

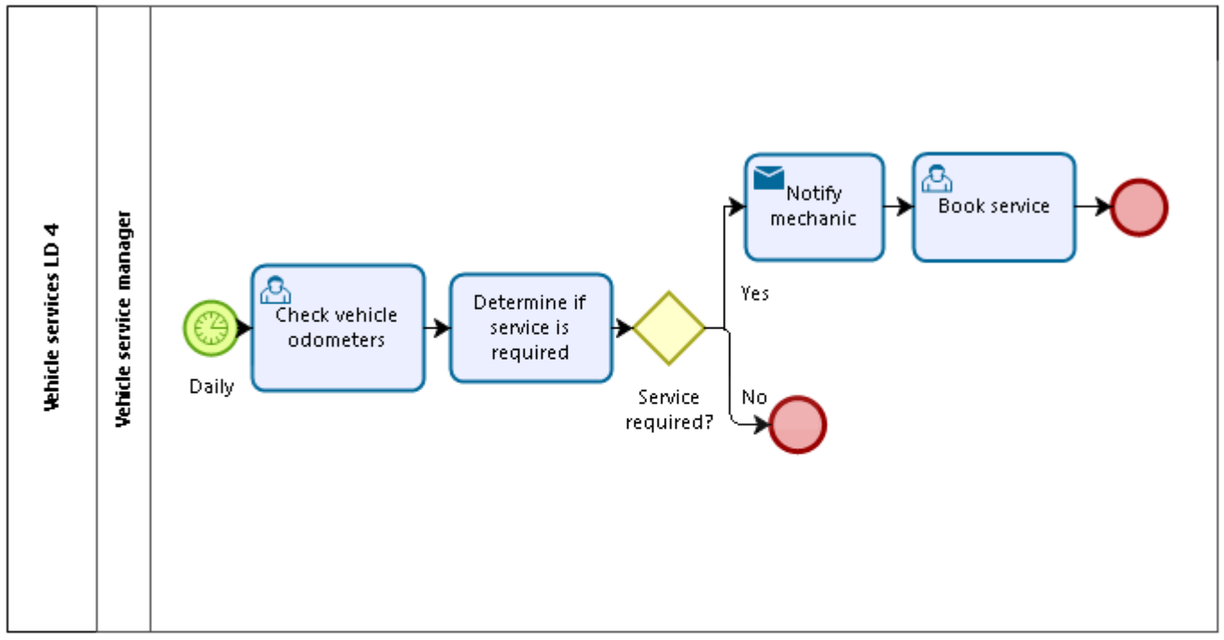


Figure 92: Long-distance logistics vehicle services process model LD 4

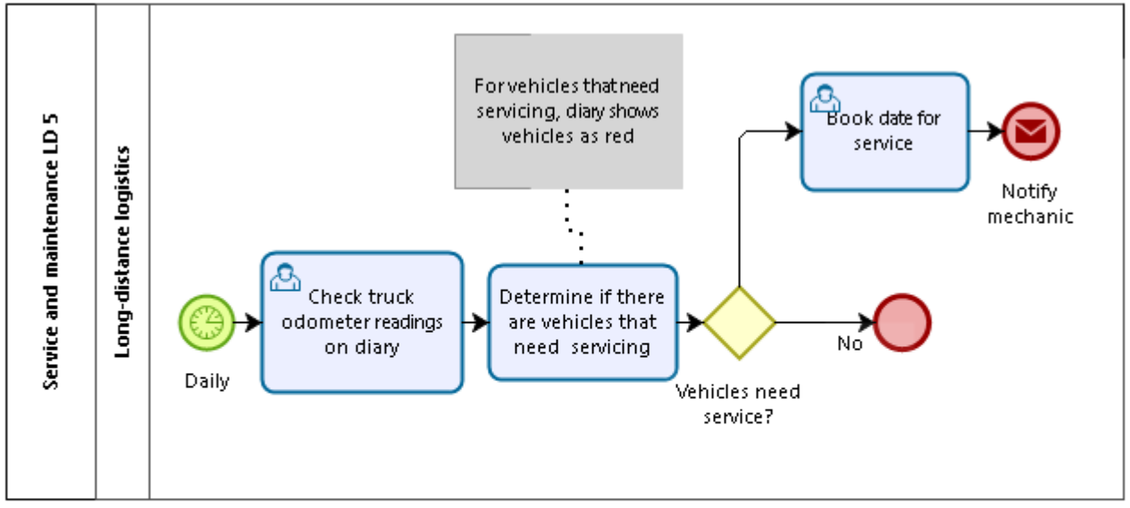


Figure 93: Long-distance logistics service and maintenance LD 5

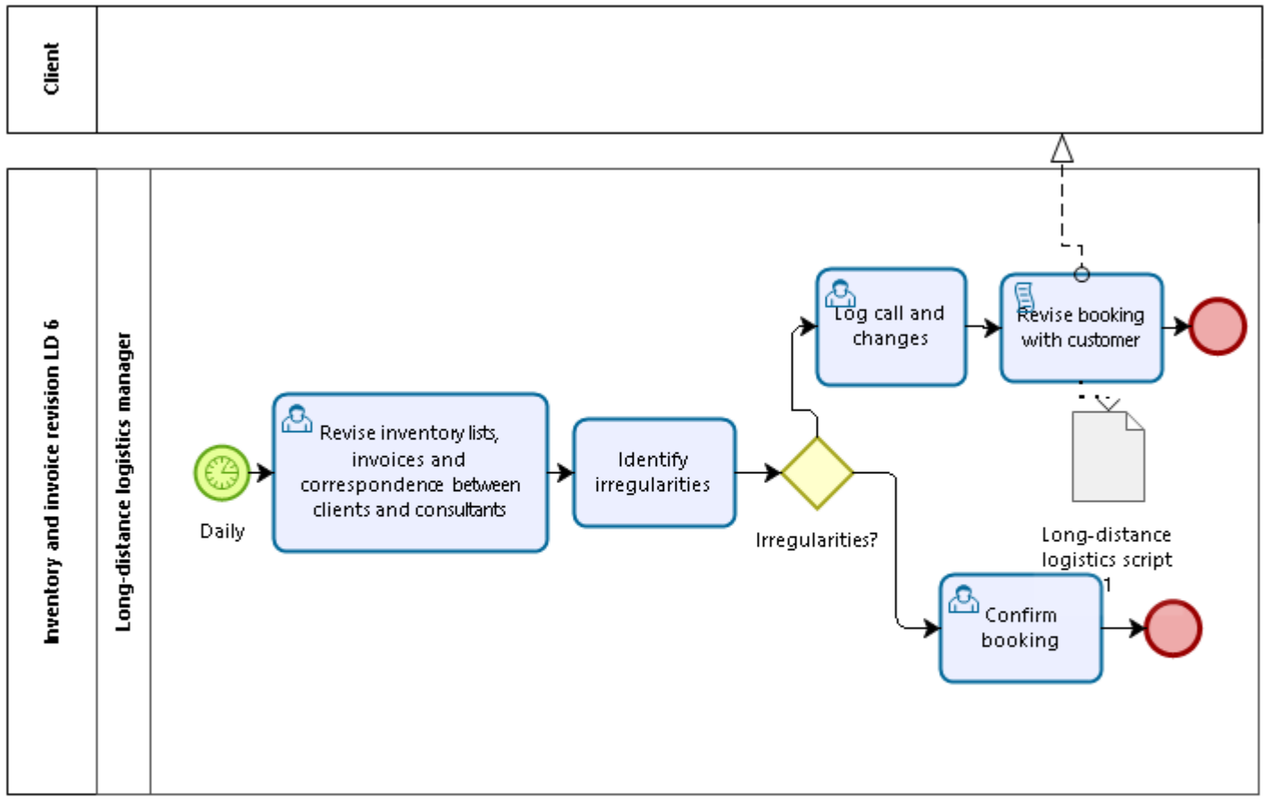


Figure 94: Long-distance logistics inventory revision LD 6

11.9.17 Long-distance logistics role description

1. Role

This role:Long-distance logistics manager

Reports to:COO

2. Purpose

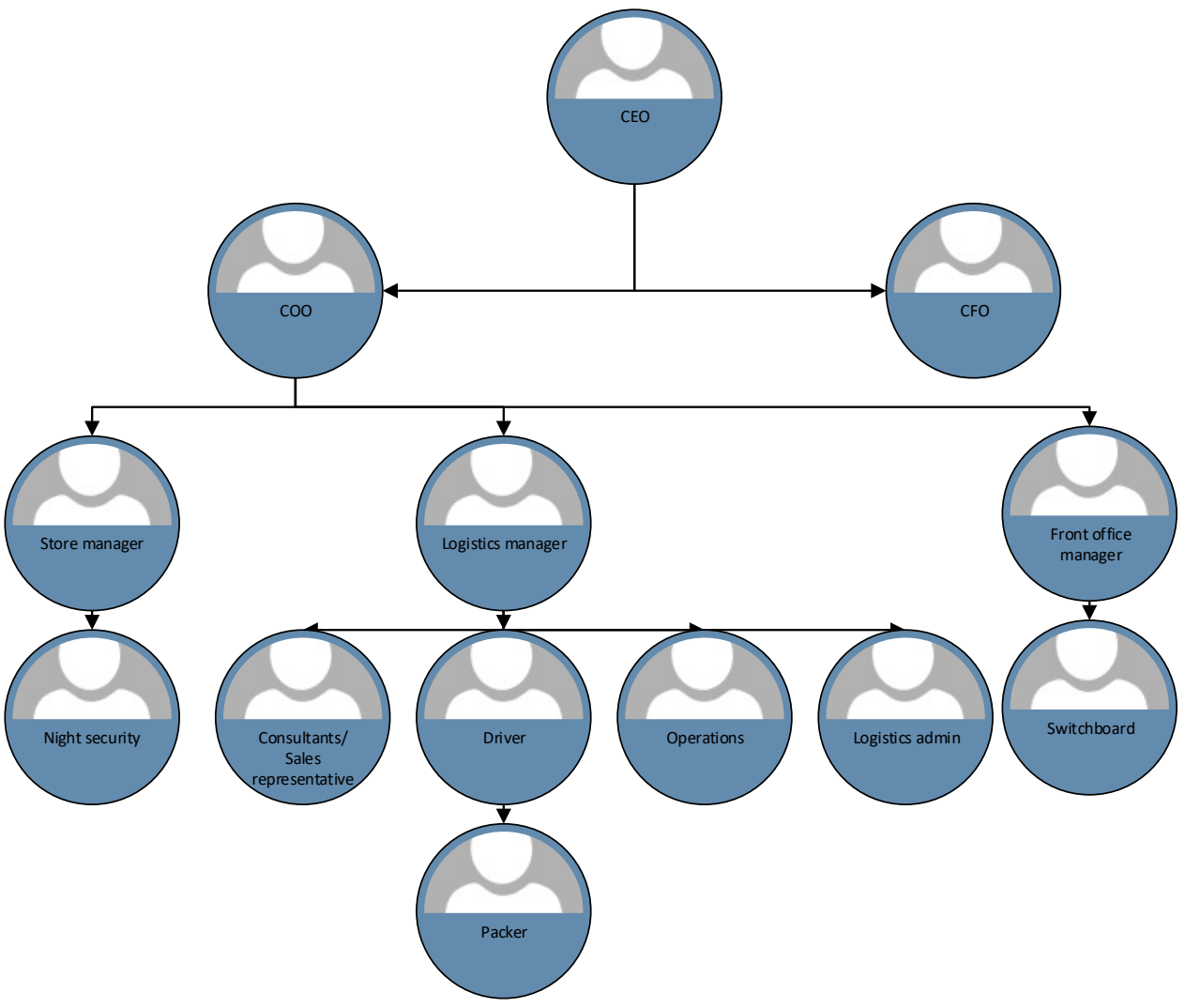
Serve clients by coordinating long-distance moves, consultants, operations, vehicles and driving teams.

3. Key performance areas

3.1 KPA 1 Long-distance vehicle and team scheduling

3.2 KPA 2 Move information revision

4. Organisational structure



5. Role

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Schedule vehicle and moving team for long-distance moves.	- Process model LD 1
KPA 2	- Review move information and confirm missing details with client.	- Process model LD 6

6. Deliverables

	Deliverables	Format	Before
Daily	Schedule for long-distance collections and deliveries.	Diary	Service date
Monthly	Moving team time sheet report	Diary	Month end

8. Skills and Education

KPA	Skill
Schedule vehicle and moving team	1. Diary system training 2. Vehicle and team knowledge 3. Basic move knowledge 4. Basic logistics knowledge
Move information revision	1. Quote system training 2. Good telephonic communication skill 3. Knowledge on typically challenging items/ situations

9. Competencies (Internal)

Competency	Level
Basic Training	Teach
Consultant Training	Teach
Service and Maintenance	Do
Transport and Logistics	Do
Procurement	Informed
Customer Satisfaction, Communication and Telephonic Selling	Informed

10. Measures of success

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Efficient schedule (Revenue per volume available in truck)					
On-time arrivals (schedule deviations per week)					
Customer complaints weekly	5	4	2	1	0
Revenue (depends on month)					

11. Incentive

Long-distance vehicles used monthly

11.9.18 Operations process model

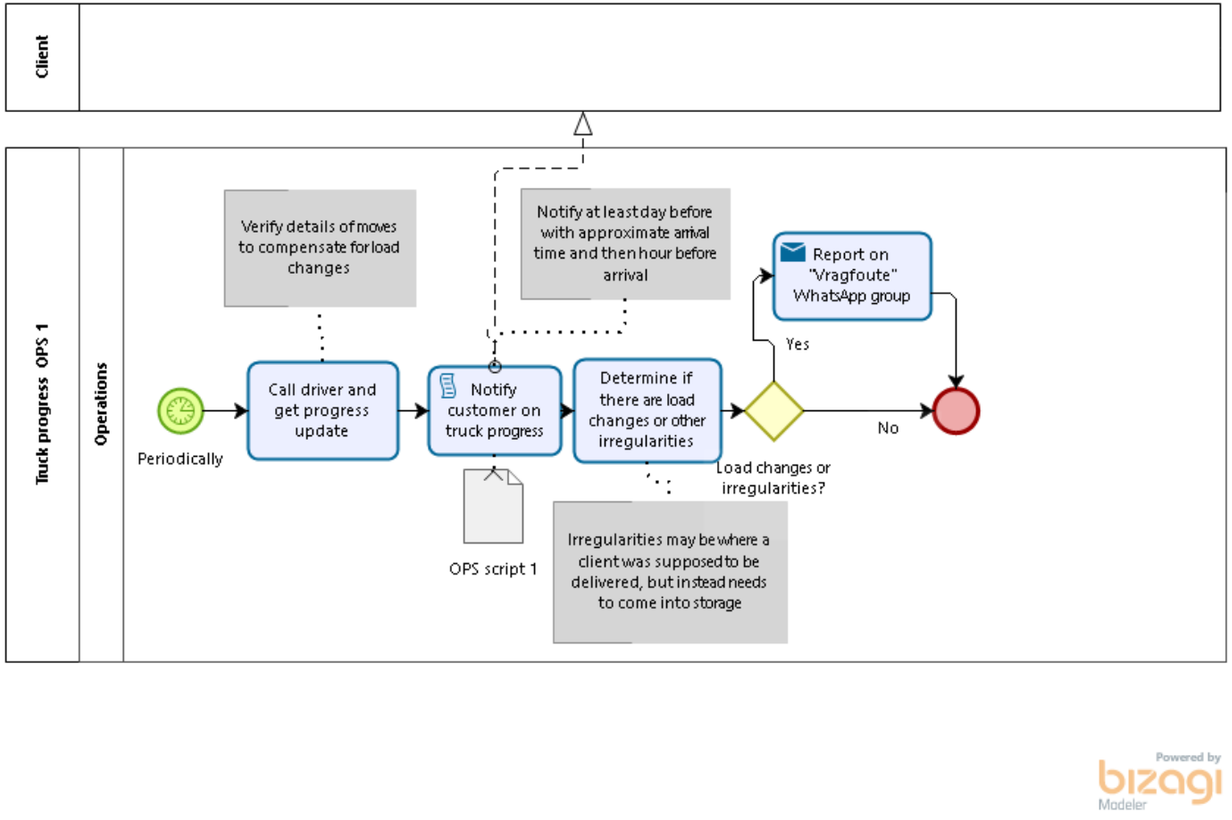


Figure 95: Operations truck progress process model OPS 1

11.9.19 Operations role description

1. **Role**

This role:Operations

Reports to:Long-distance logistics manager

2. **Purpose**

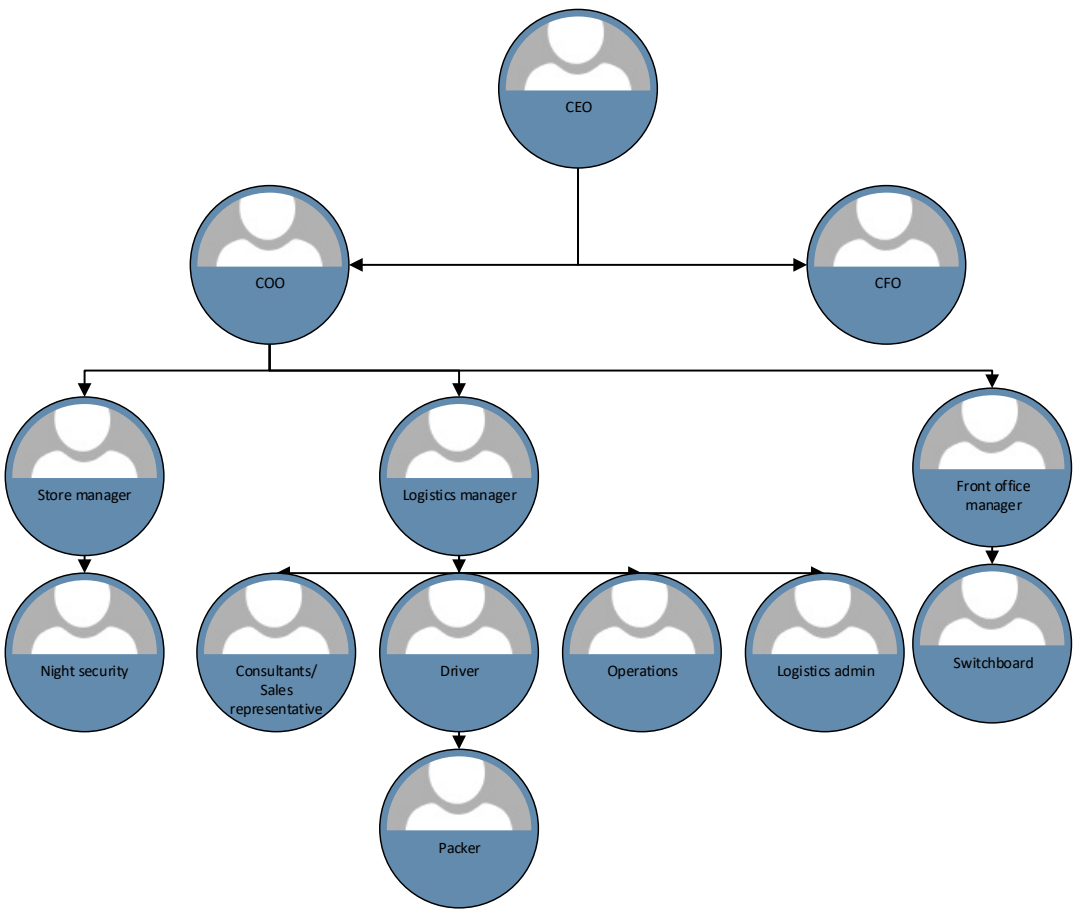
Serves the customer by mediating between long-distance vehicle and customer.

3. **Key performance areas**

3.1 KPA 1 Conformance to long-distance schedule

3.2 KPA 2 Communication with customers and teams

4. **Organisational structure**



5. **Role**

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Ensure vehicles conform to long-distance vehicle schedule.	- Process model OPS 1
KPA 2	- Communicate with customers and teams to ensure customer readiness.	- Process model OPS 1

6. **Skills and education**

KPA	Skill
Conformance to long-distance schedule	1. Basic computer literacy 2. Matrix vehicle tracking 3. Diary system interpretation
Communication with customers and teams	1. Professional communication to customer

7. **Competencies (Internal)**

Competency	Level
Basic Training	Do
Consultant Training	Informed
Service and Maintenance	Informed
Transport and Logistics	Do
Procurement	Informed
Customer Satisfaction, Communication and Telephonic Selling	Do

4. Measures of success

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Schedule conformance	70%	75%	80%	90%	100%
Customer readiness	70%	75%	80%	90%	100%

11.9.20 Confirmations process model

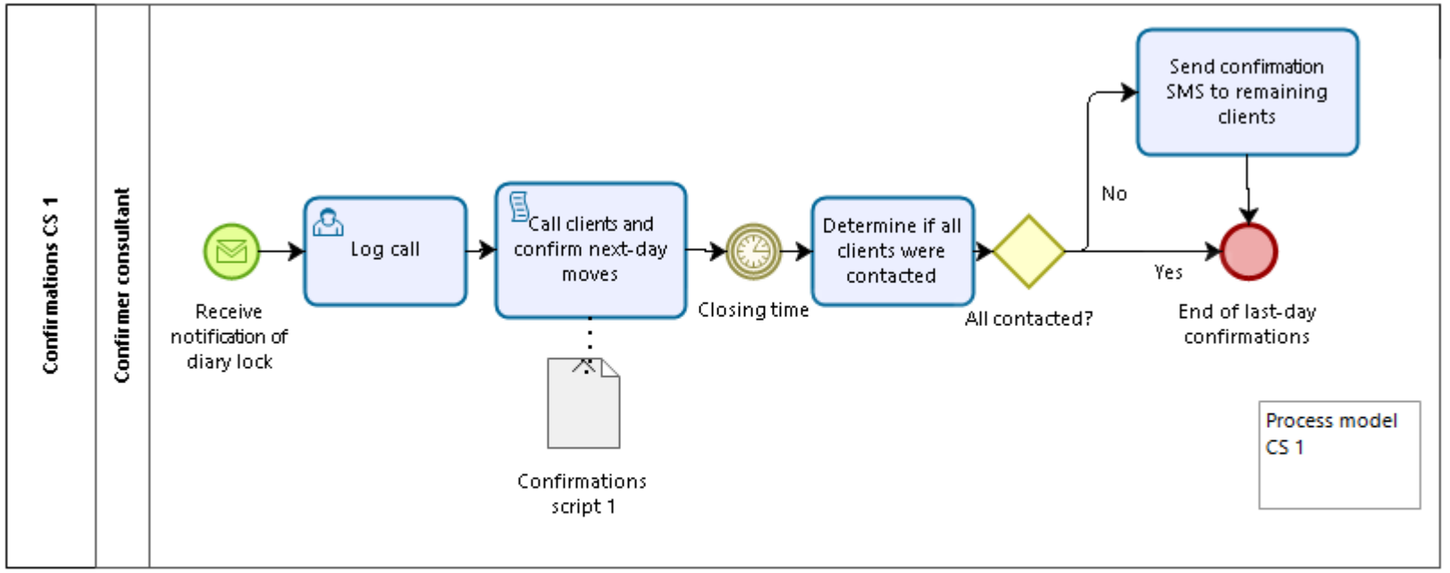


Figure 96: Confirmations process model CS 1

11.9.21 Confirmer role description

1. **Role**

This role:Last day confirmer

Reports to:Logistics manager

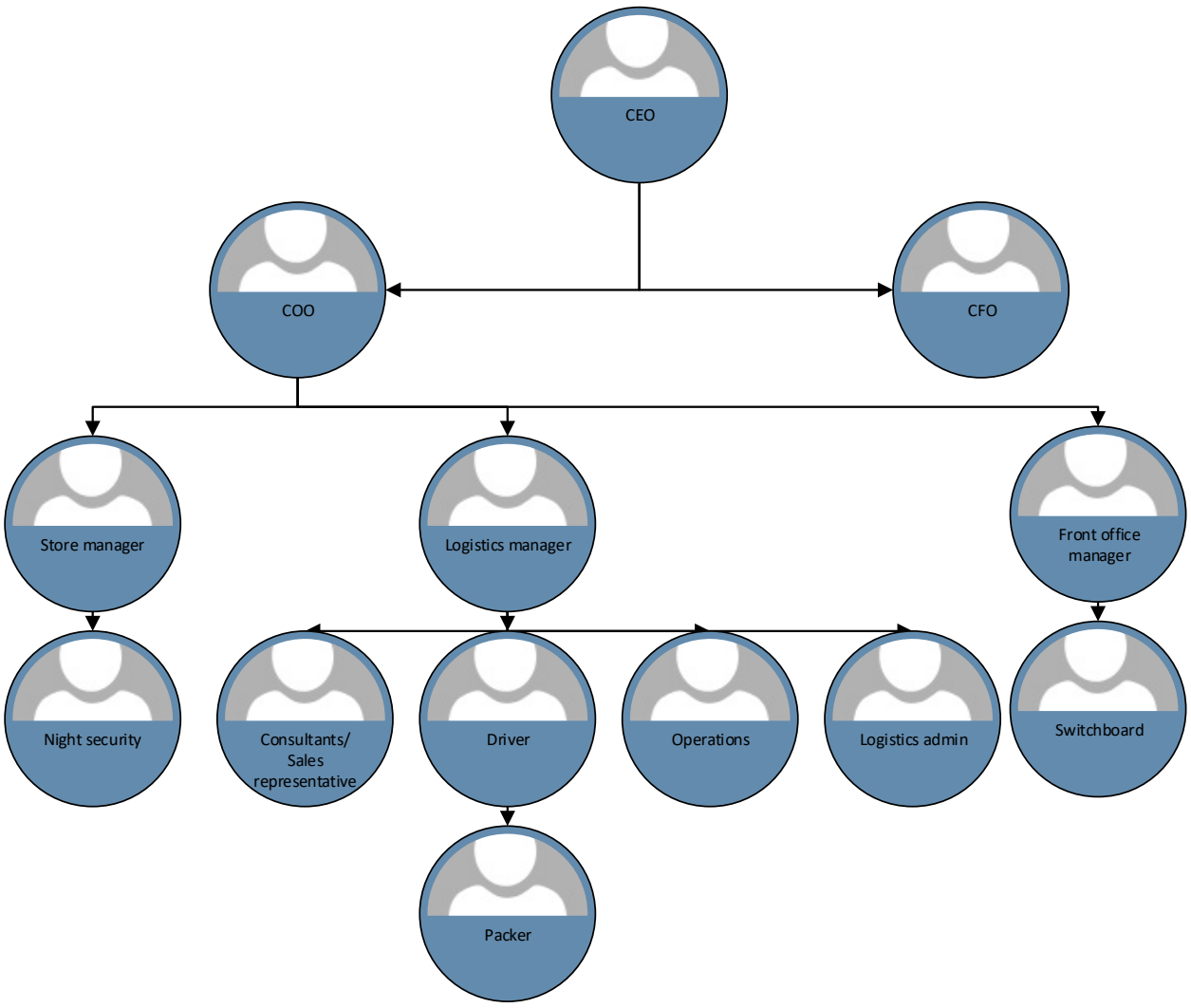
2. **Purpose**

Serve the customer by confirming the estimated arrival time and any pre-removal preparations.

3. **Key performance areas**

3.1 KPA 1 Client readiness

4. **Organisational structure**



5. **Role**

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Ensuring that the client is aware of the expected vehicle arrival times and ready to move with all necessary preparations.	- Process model CS 1, - Confirmation script

6. **Deliverables**

	Deliverables	**Format**	**Before**
Daily	Confirmed client	Confirmation on diary	Day-end

7. **Skills and Education**

KPA	Skill
Client readiness	5. Quote and diary system training 6. Good telephonic communication skills

8. **Competencies (Internal)**

Competency	Level
Basic Training	Do
Consultant Training	Do
Service and Maintenance	Informed
Transport and Logistics	Informed
Procurement	Informed
Customer Satisfaction, Communication and Telephonic Selling	Do

9. **Measures of success**

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Customer readiness	70%	75%	80%	90%	100%

11.9.22 Logistics admin process models

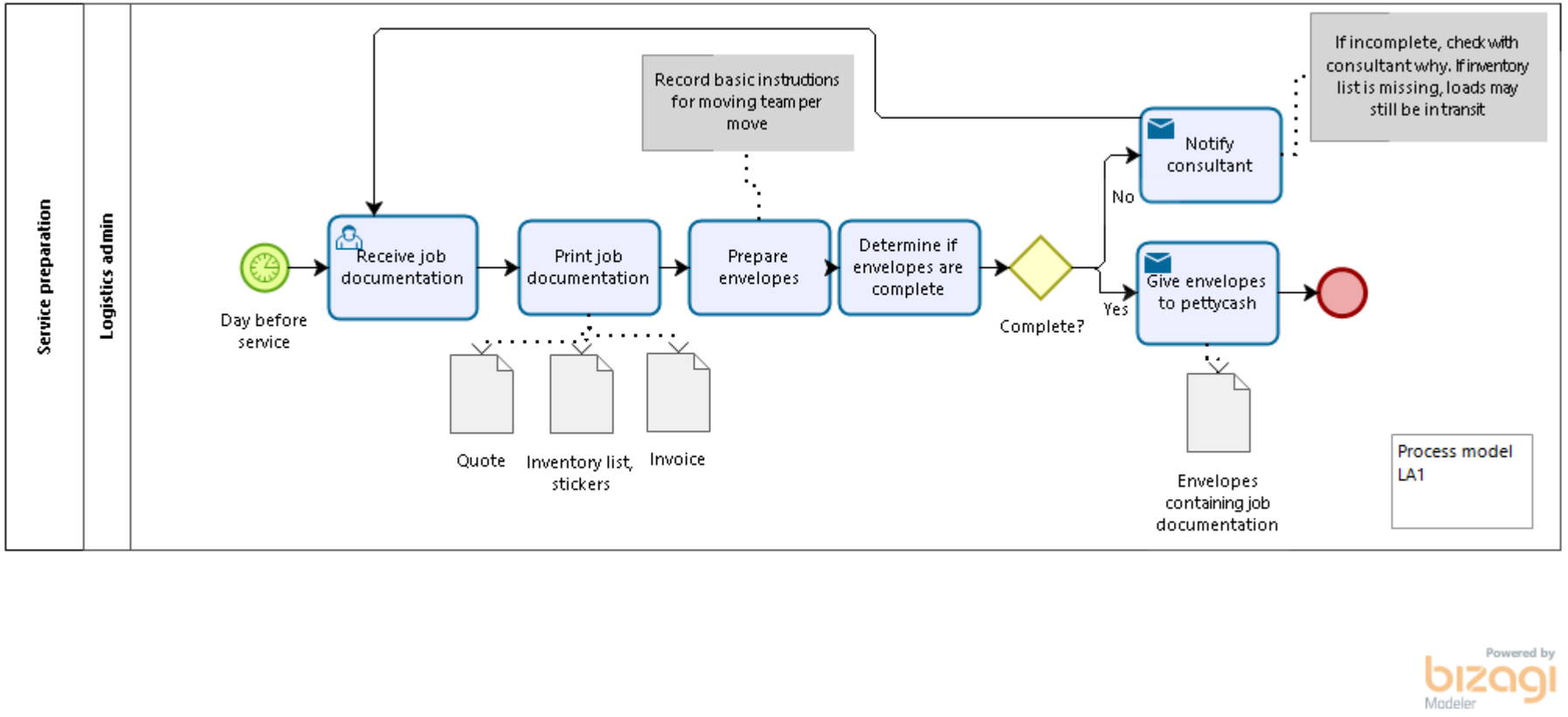


Figure 97: Logistics admin service preparation LA 1

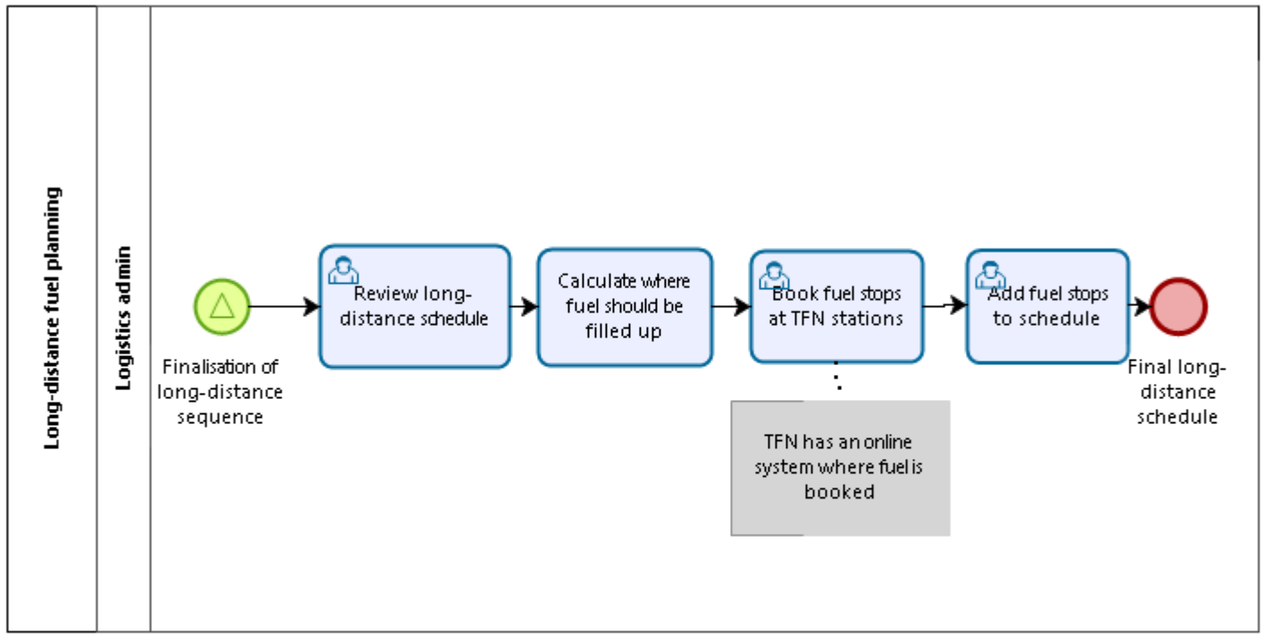


Figure 98: Logistics admin fuel planning process model LA 2

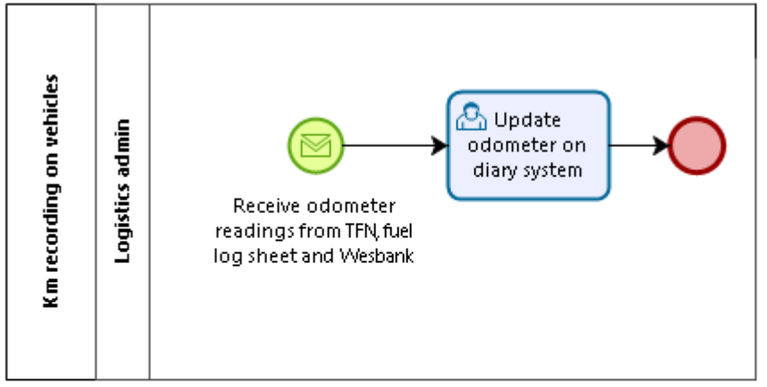


Figure 99: Logistics admin vehicle km recording LA 3

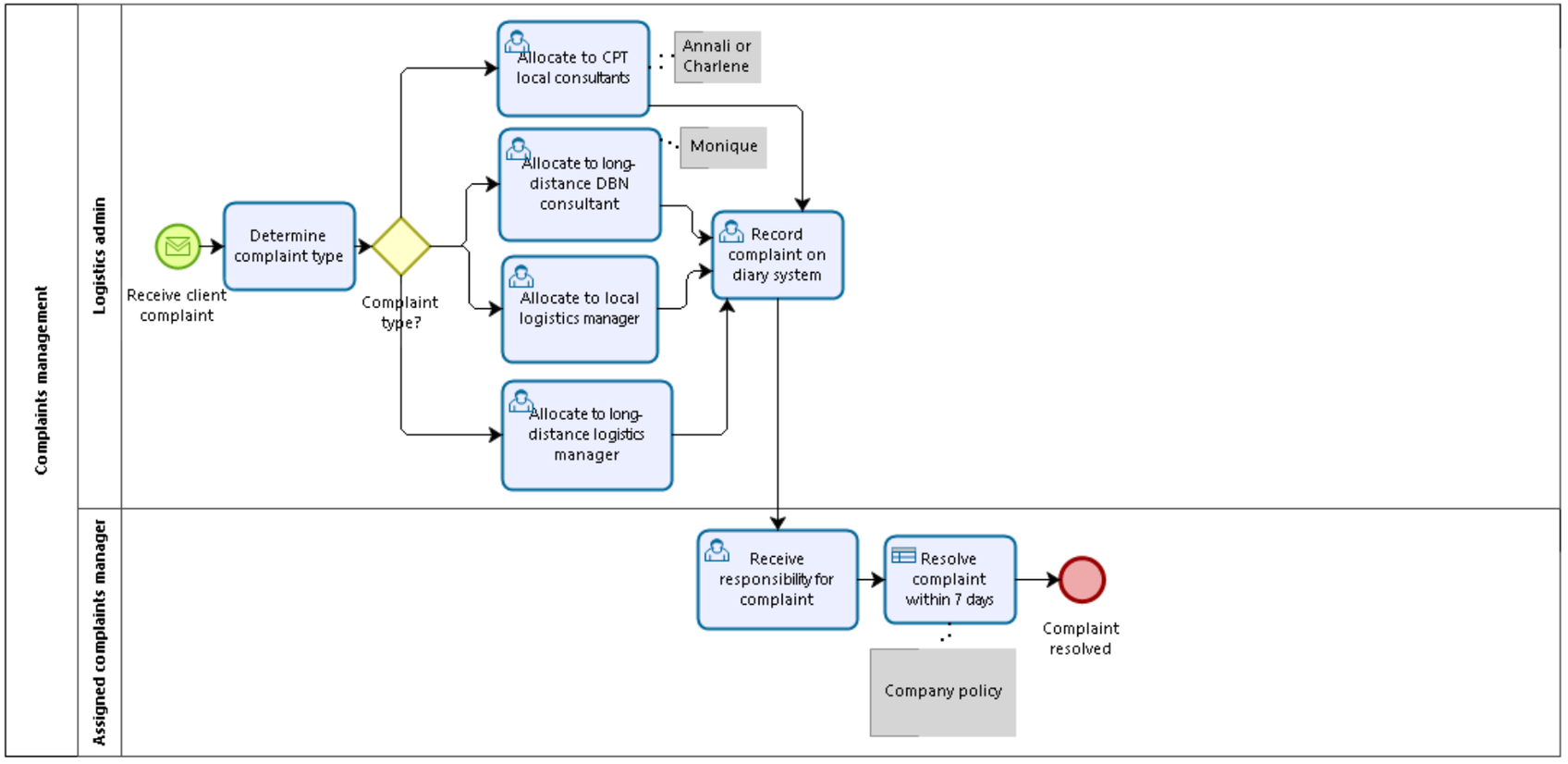


Figure 100: Logistics admin complaints LA 4

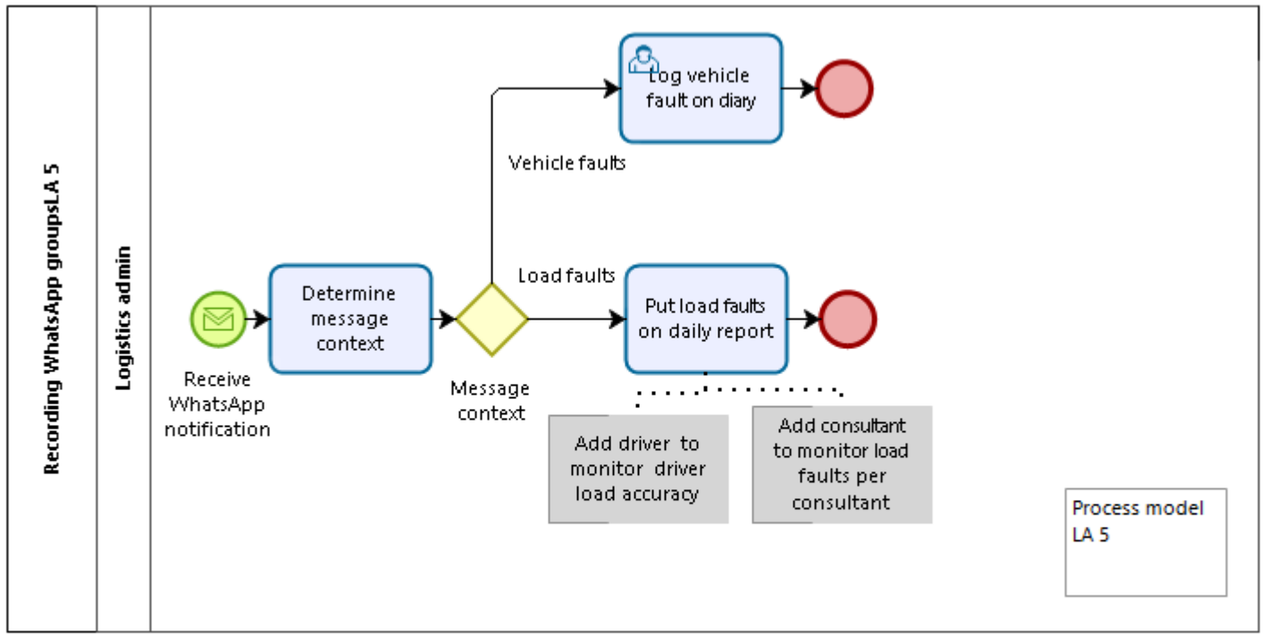


Figure 101: Logistics admin process model LA 5

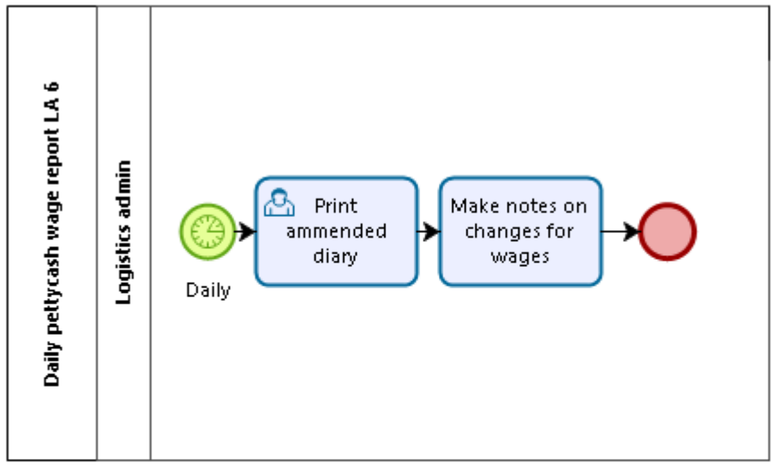


Figure 102: Logistics admin process model LA 6

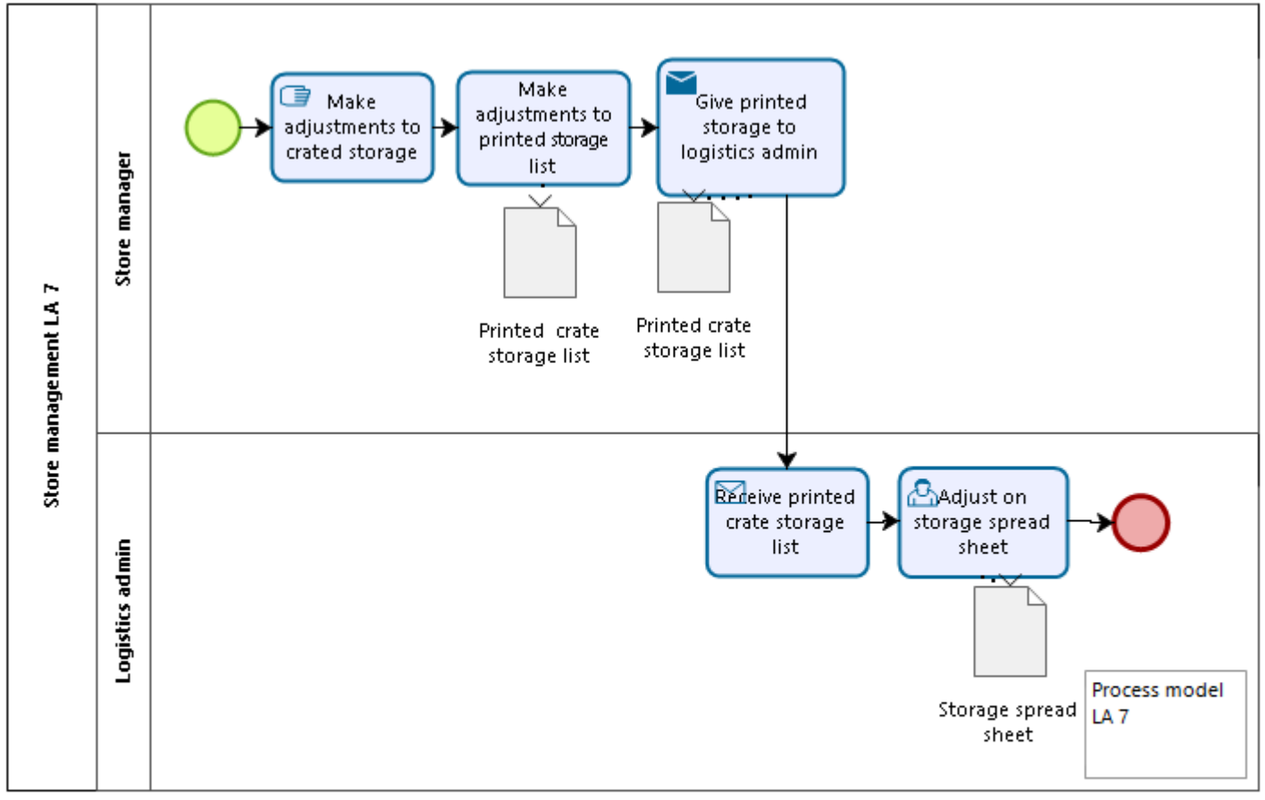


Figure 103: logistics admin store management LA 7

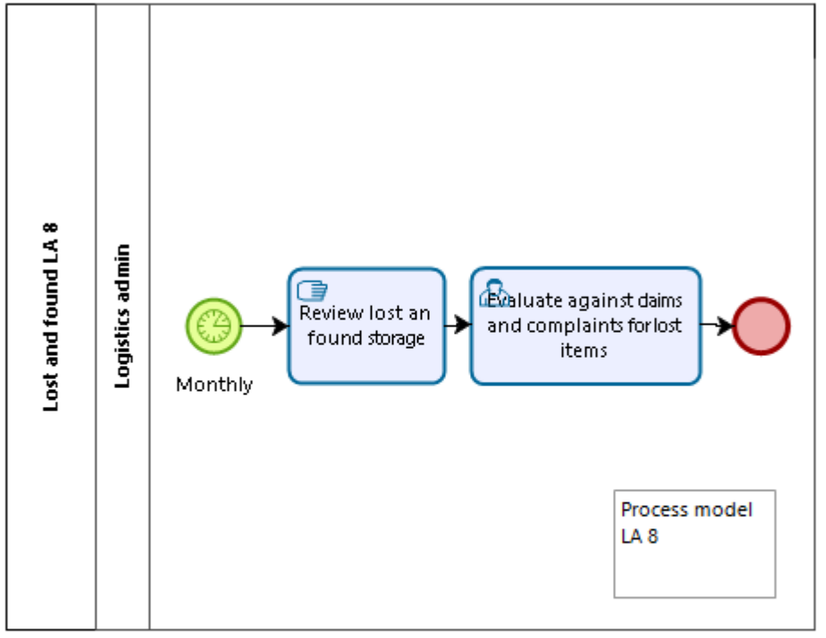


Figure 104: Logistics admin lost and found LA 8

11.9.23 Logistics admin role description

1. **Role**

This role:Logistics admin

Reports to:Logistics managers

2. **Purpose**

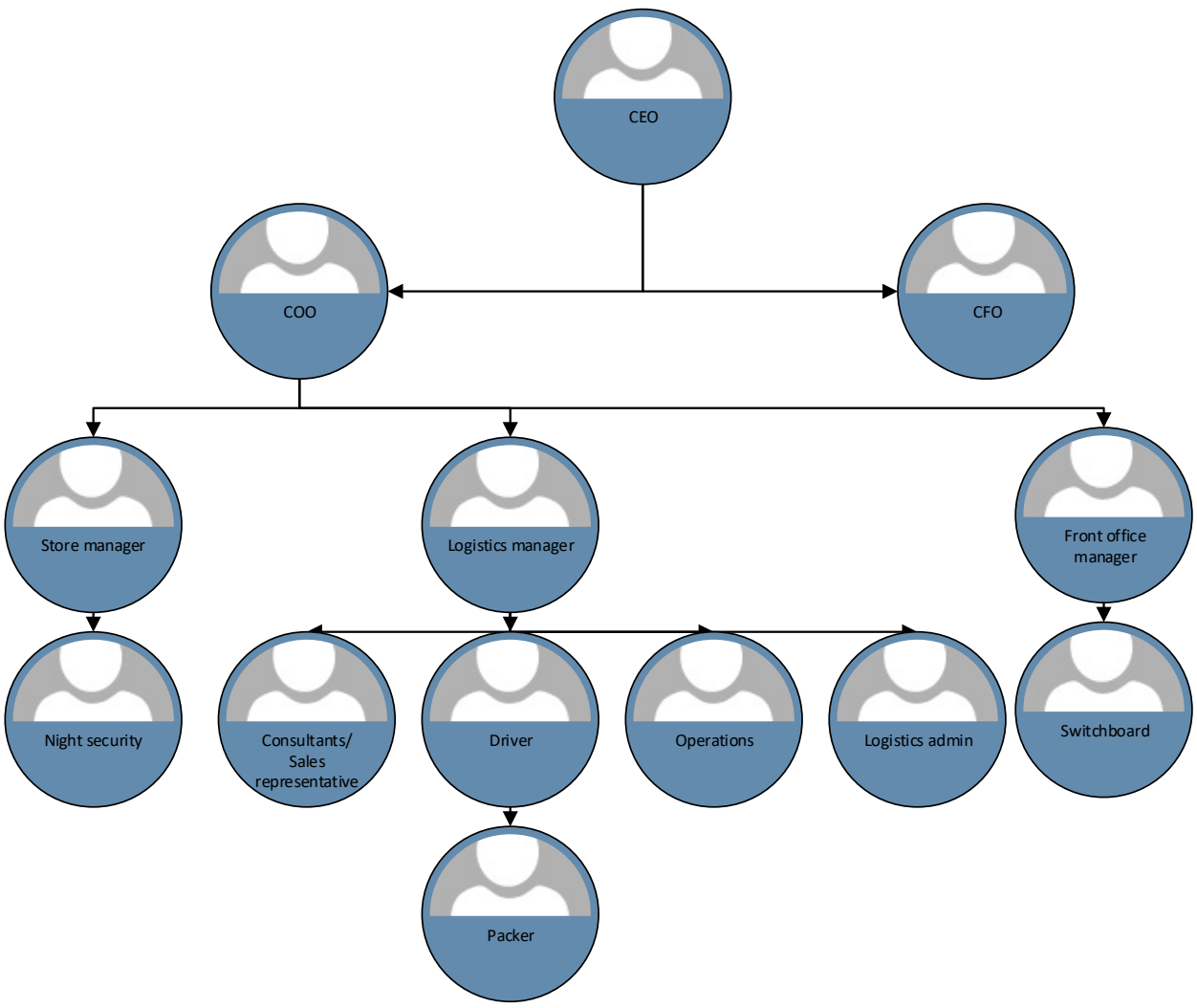
To administrate all local and long-distance logistics activities.

3. **Key performance areas**

3.1 KPA 1 Fuel planning

3.2 KPA 2 Complaints management

4. **Organisational Structure**



5. **Role**

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Ensure that all vehicles are fueled	- Process model LA 2
KPA 2	- Ensure that complaints are resolved within 7 days of submittal.	- Process model LA 4

6. **Deliverables**

	Deliverables	Format	Before
Daily	Next day job documentation	Envelope	5 PM
	Long-distance fuel planning	Diary	5 PM
	Report on km's and consumption	Spreadsheet	Day-end
	WhatsApp groups report	Spreadsheet	Day-end
	Daily petty cash report	Spreadsheet	Day-end
Weekly	Complaints	Logged on diary	Day-end

7. **Skills and Education**

KPA	Skill
Financial Management	1. Relevant Skills required

8. **Competencies (Internal)**

Competency	Level
Basic Training	Teach
Consultant Training	Do
Service and Maintenance	Informed
Transport and Logistics	Do
Procurement	Do
Customer Satisfaction, Communication and Telephonic Selling	Do

5. Measures of success

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Up-to-date registration					

11.9.24 Petty cash process model

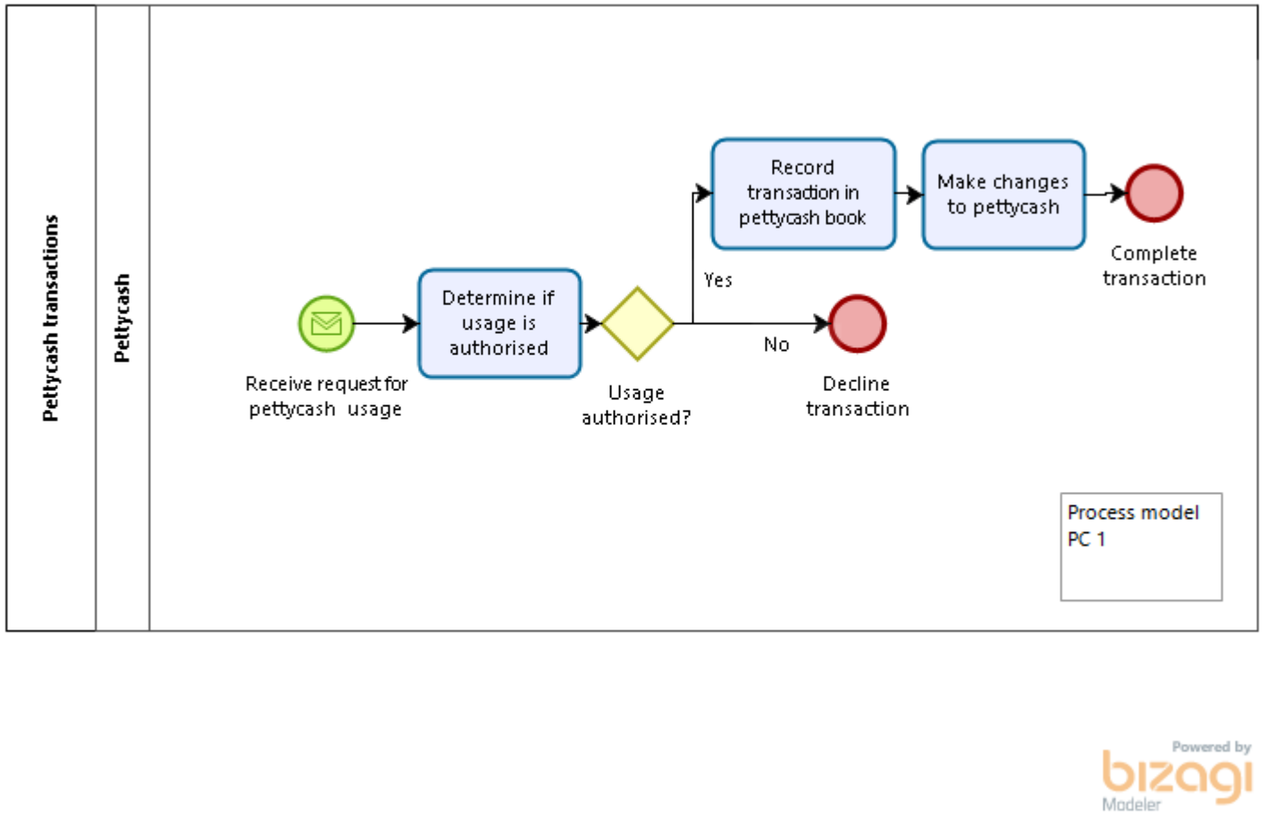


Figure 105: Petty cash transactions process model PC 1

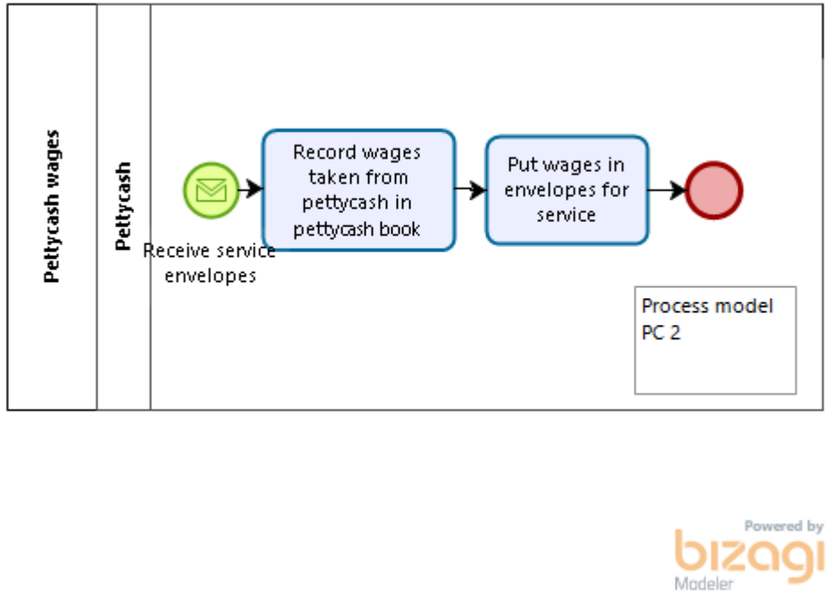


Figure 106: Petty cash wages process model PC 2

11.9.25 Drivers and teams long-distance service process model

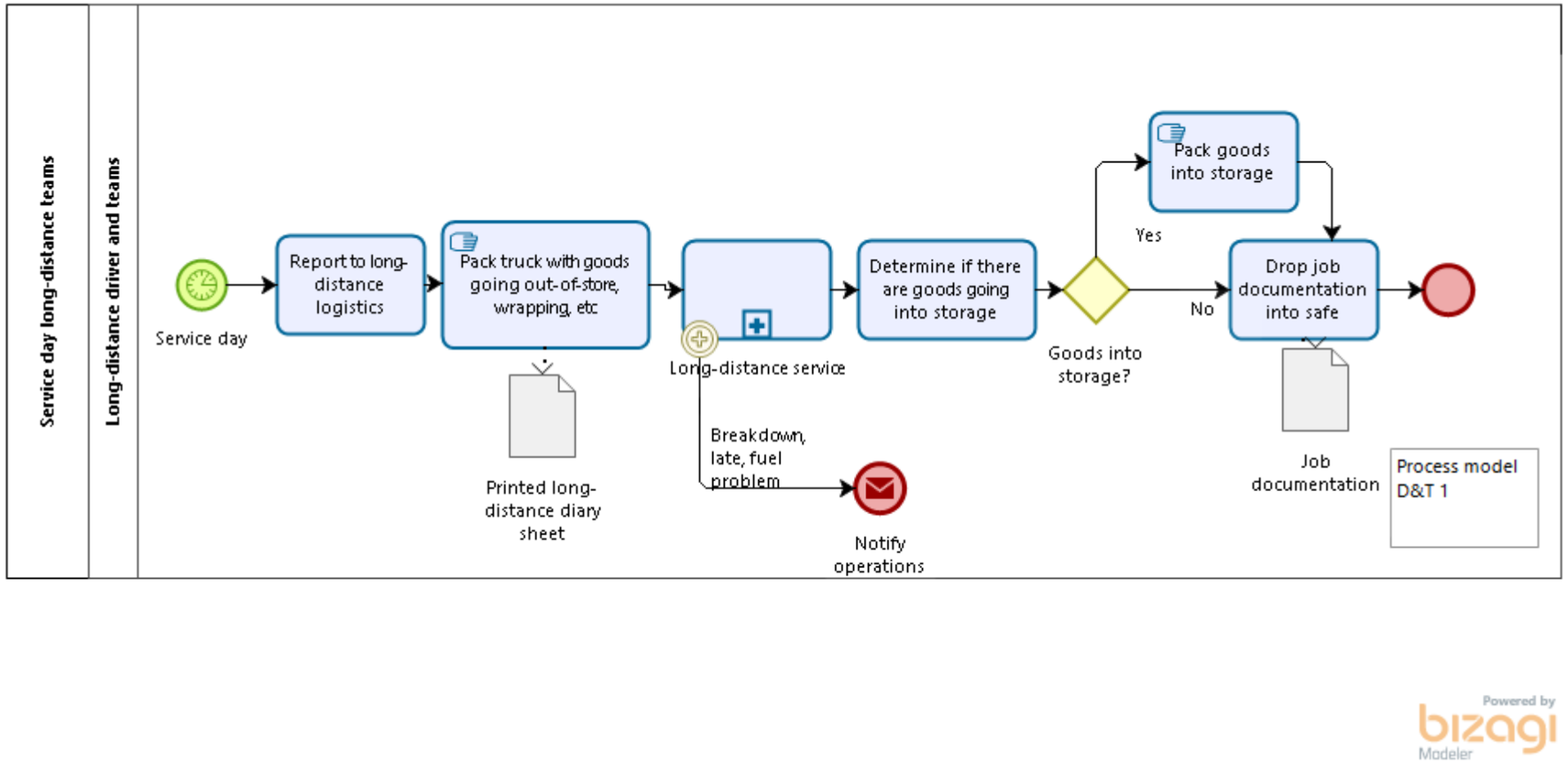


Figure 107: Drivers and teams long-distance D&T 1

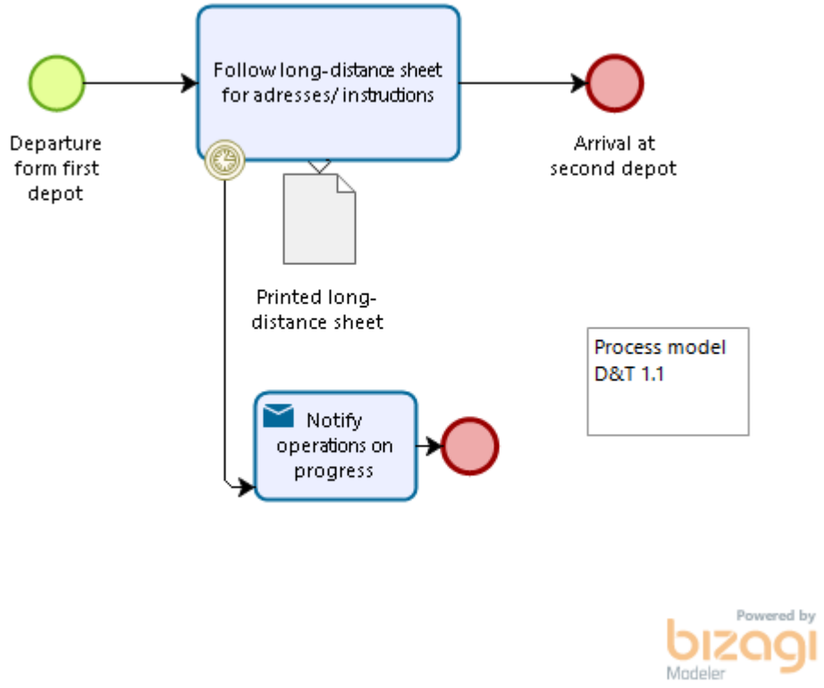


Figure 108: Drivers and teams long-distance sub process D&T 1.1

11.9.26 Drivers and teams local process model

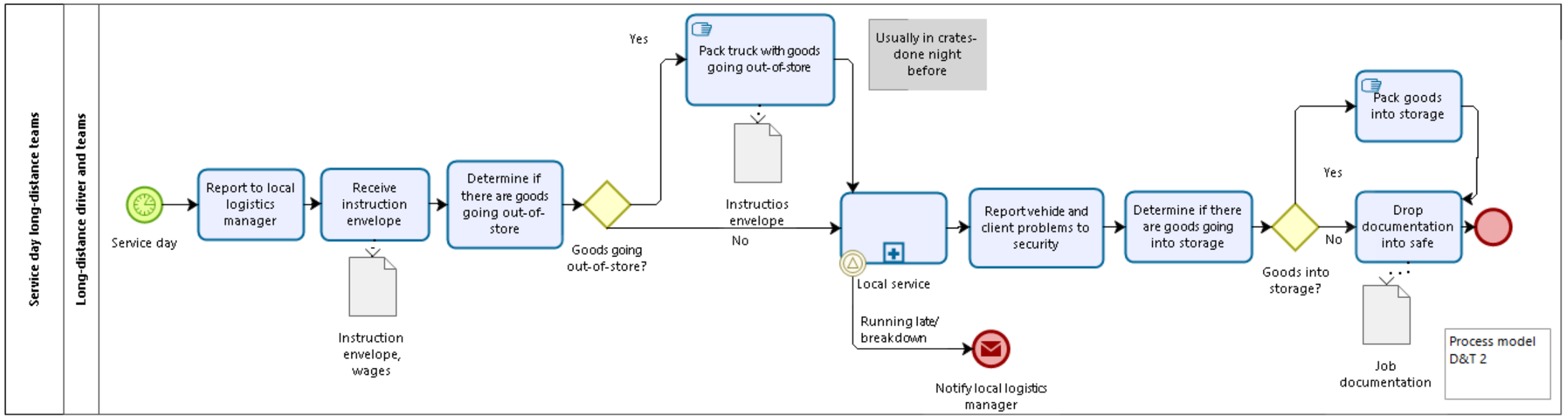


Figure 109: Drivers and teams local D&T 2

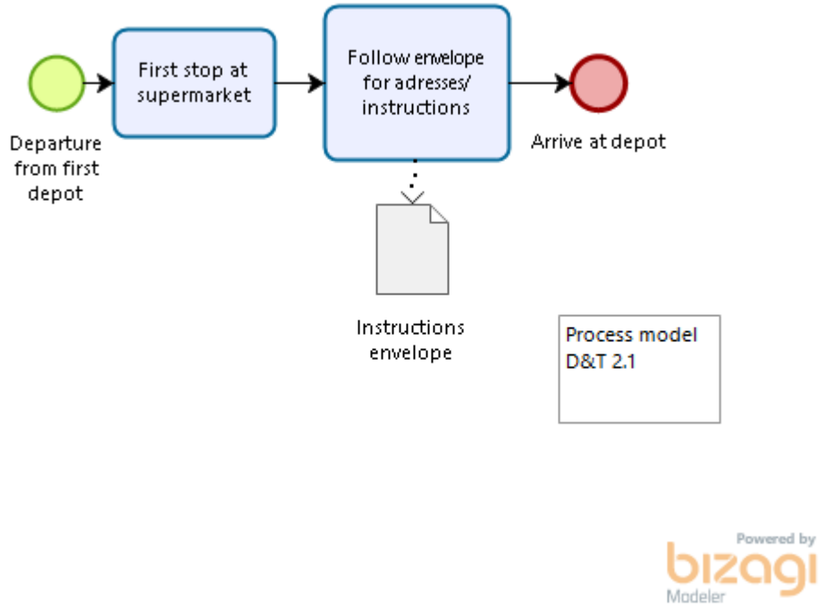


Figure 110: Drivers and teams sub process D&T 2.1

11.9.27 Drivers role description

1. **Role**

This role:Driver and team leader

Reports to:Operations/ logistics

2. **Purpose**

Serve the customer by driving collection and delivery vehicles and supervising move.

3. **Key performance areas**

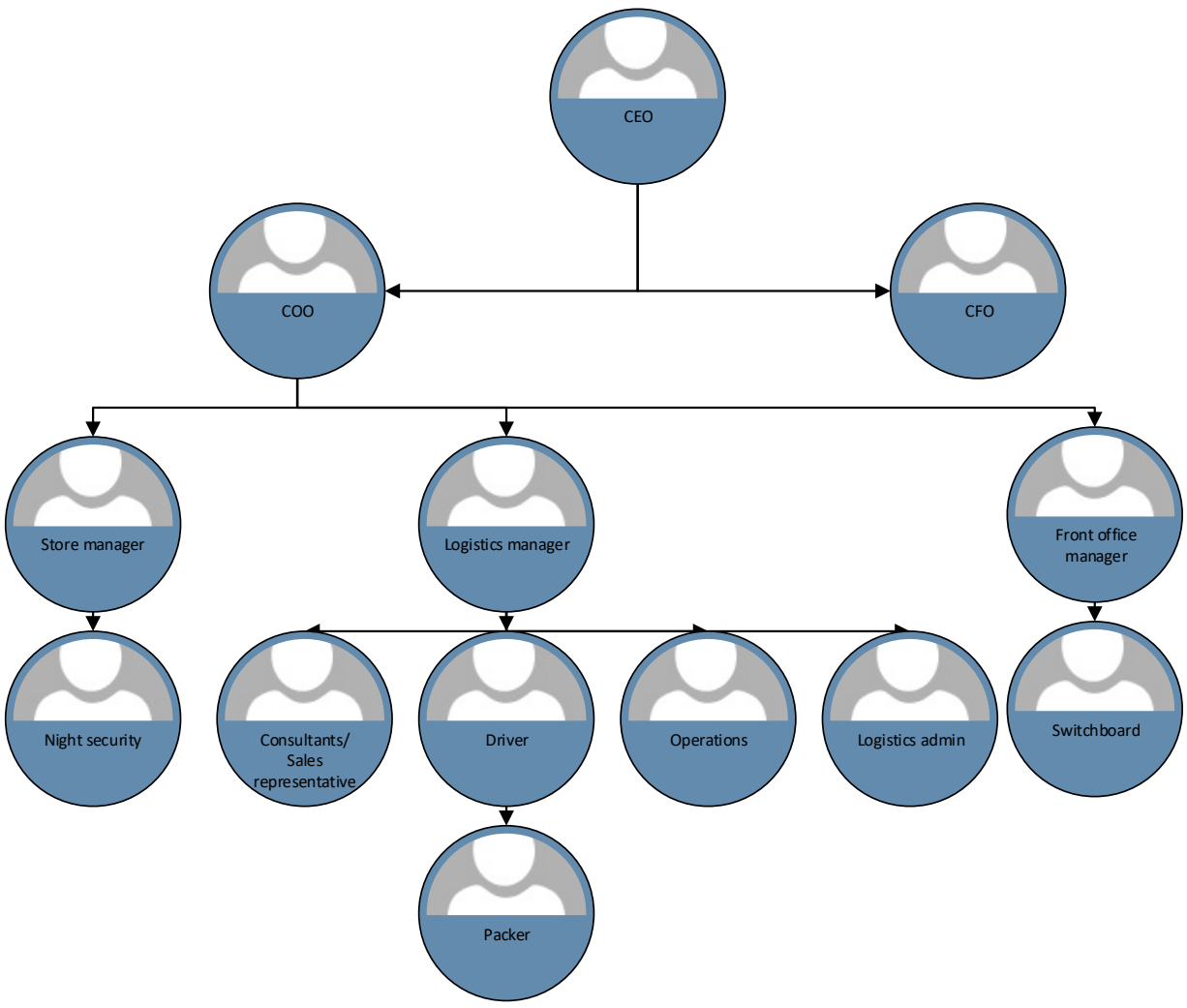
3.1 KPA 1 Team performance

3.2 KPA 2 Load accuracy

3.3 KPA 3 Fuel consumption

3.4 KPA 4 Professional client contact

4. **Organisational structure**



5. **Role**

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Evaluate the moving team's performance during the move. Report poor performance to logistics.	- Process model D&T 1 and 2
KPA 2	- Immediately report load irregularities to logistics.	- Process model D&T 1 and 2 and Sec 1, LA 5

Performance Area	Responsibility	Ref:
KPA 3	- Follow standard fuel procedures	- Process model D&T 1
KPA 4	- Act professionally when in contact with client	- Process model D&T 1 and 2

6. Deliverables

	Deliverables	Format	Before
Daily	Inventory list	Signed by customer	Arrival at depot

7. Skills and Education

KPA	Skill
Team performance	1. Team motivation.
Load accuracy	1. Understand inventory list and instructions. 2. Good sense for volumes.
Fuel performance	1. Adequate driving.
Professional client contact	1. Adequate and gracious communication

8. Competencies (Internal)

Competency	Level
Basic Training	N/A
Consultant Training	N/A
Service and Maintenance	Informed
Transport and Logistics	Informed
Procurement	N/A
Customer satisfaction and basic communication	Do

6. Measures of success

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Client testimonials (Depending on testimonials)					
Complaints	5	3	2	1	0
Fuel consumption (Depending on vehicle and					

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
routes- litres/km)					
Number of load faults reported	6	5	4	3	1

11.9.28 Packer role description

1. Role

This role:Packer

Reports to:Driver then logistics/ operations

2. Purpose

Serve customer by physically assisting in packing and/ or wrapping client valuables during collection and delivery.

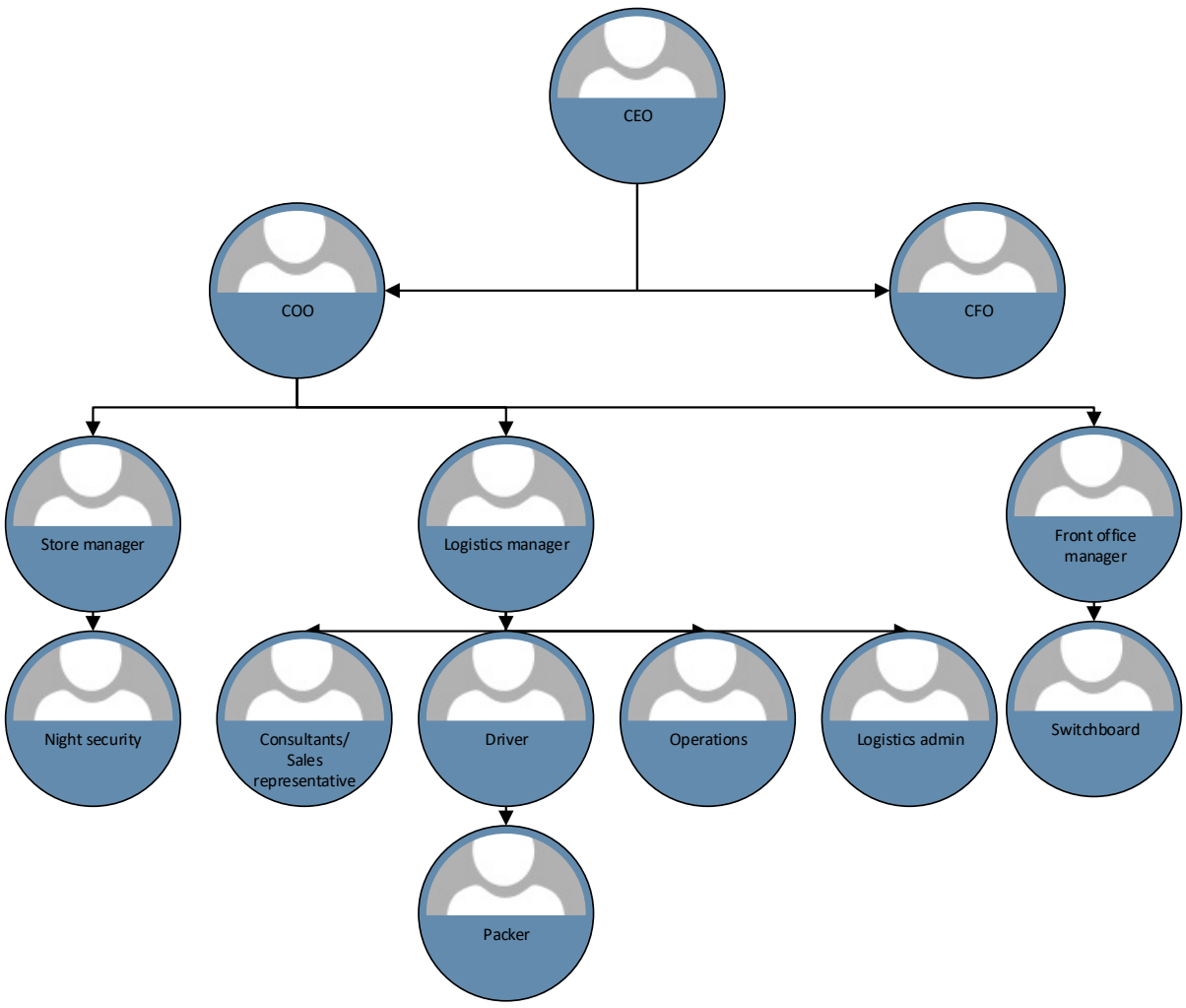
3. Key performance areas

3.1 KPA 1 Professional client contact

3.2 KPA 2 Immediately report load irregularities to driver

3.3 KPA 3 Packing performance

4. Organisational structure



Role

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Act professionally when in contact with client.	- Process model D&T 1 and 2
KPA 2	- Report load irregularities to driver.	- Process model D&T 1 and 2
KPA 3	- Swift and meticulous packing and/ or wrapping of client possessions.	- Process model D&T 1 and 2

5. **Skills and Education**

KPA	Skill
Professional client contact	1. Adequate and gracious communication
Load irregularities	1. Identify load irregularities
Packing performance	1. Skillful wrapping and box packing as well as vehicle loading and off-loading.

8. **Competencies (Internal)**

Competency	Level
Basic Training	N/A
Consultant Training	N/A
Service and Maintenance	Informed
Transport and Logistics	Informed
Procurement	N/A
Customer satisfaction and communication	Do

6. **Measures of success**

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Client testimonials (depending on testimonials)					
Complaints (especially on inventory condition)	5	3	2	1	0
Wrapping and packing standard (time/ cubic feet- depending on contents)					

11.9.29 Night security process model

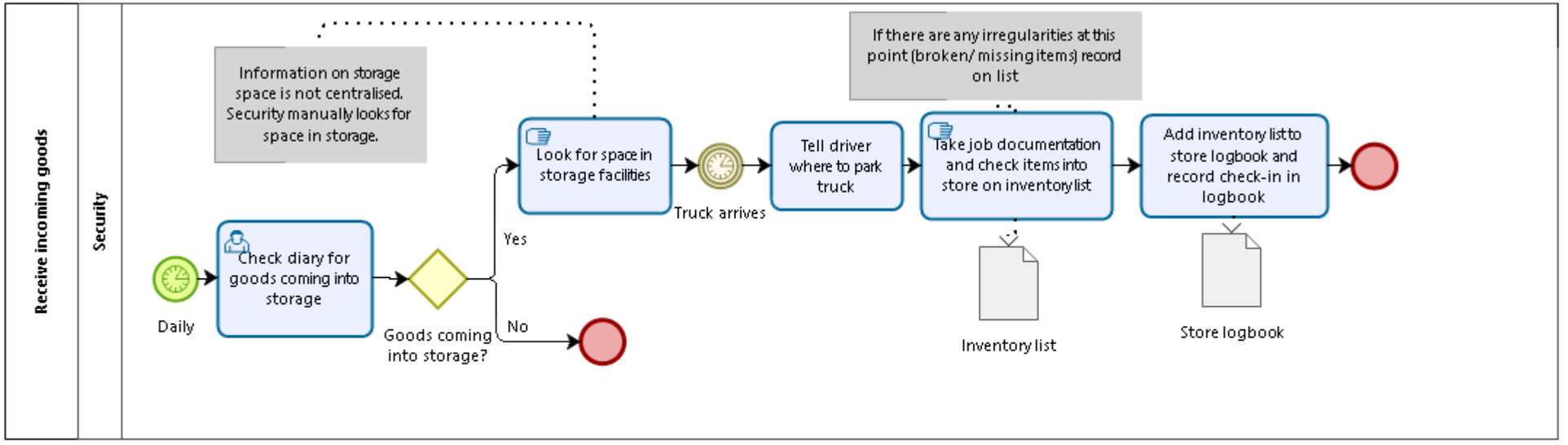


Figure 111: Security receive incoming goods Sec 1

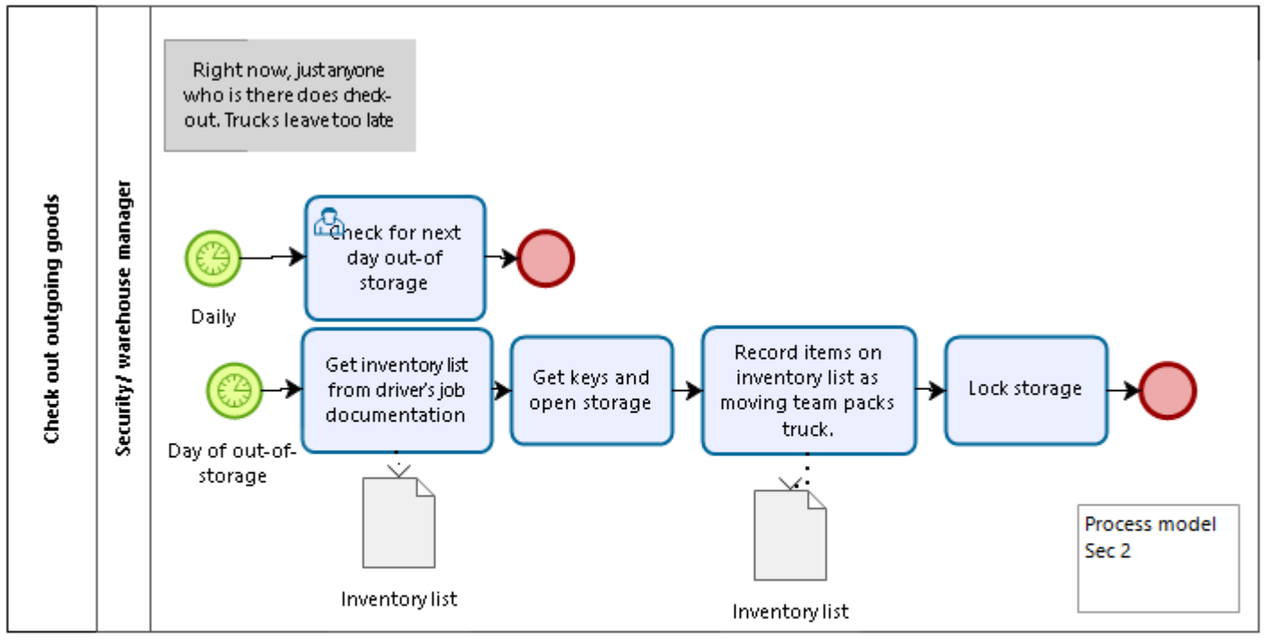


Figure 112: Security outgoing goods Sec 2

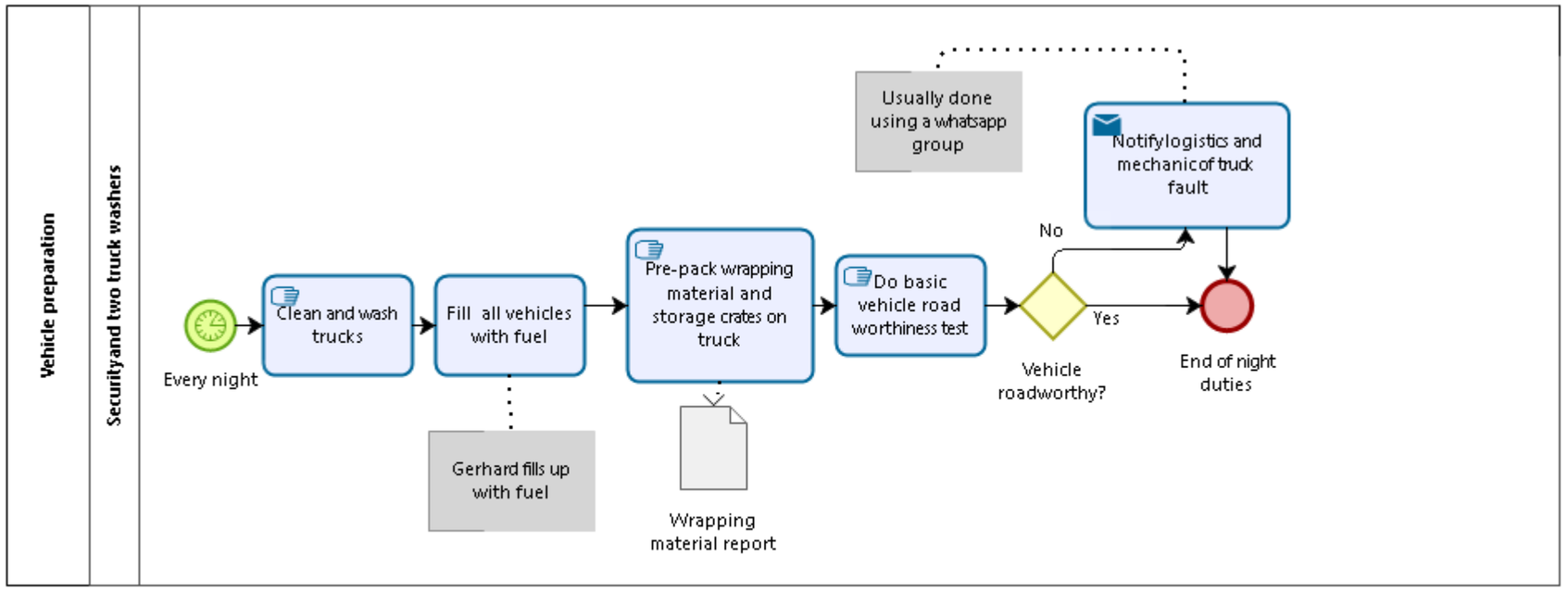


Figure 113: Security vehicle preparation Sec 3

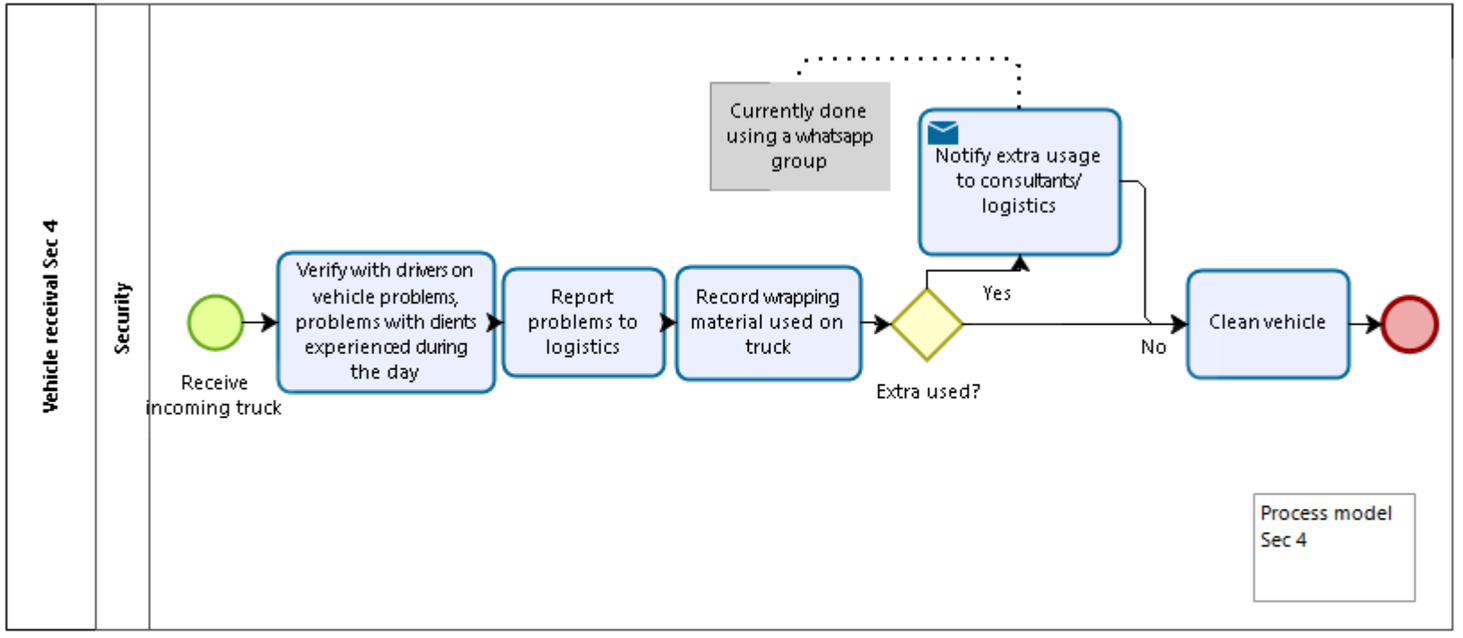


Figure 114: Security vehicle receival Sec 4

11.9.30 Night security role description

1. **Role**

This role:Night security

Reports to:Warehouse managers

2. **Purpose**

To serve as aid for incoming vehicles and teams and to prepare vehicles for next day's service.

3. **Key performance areas**

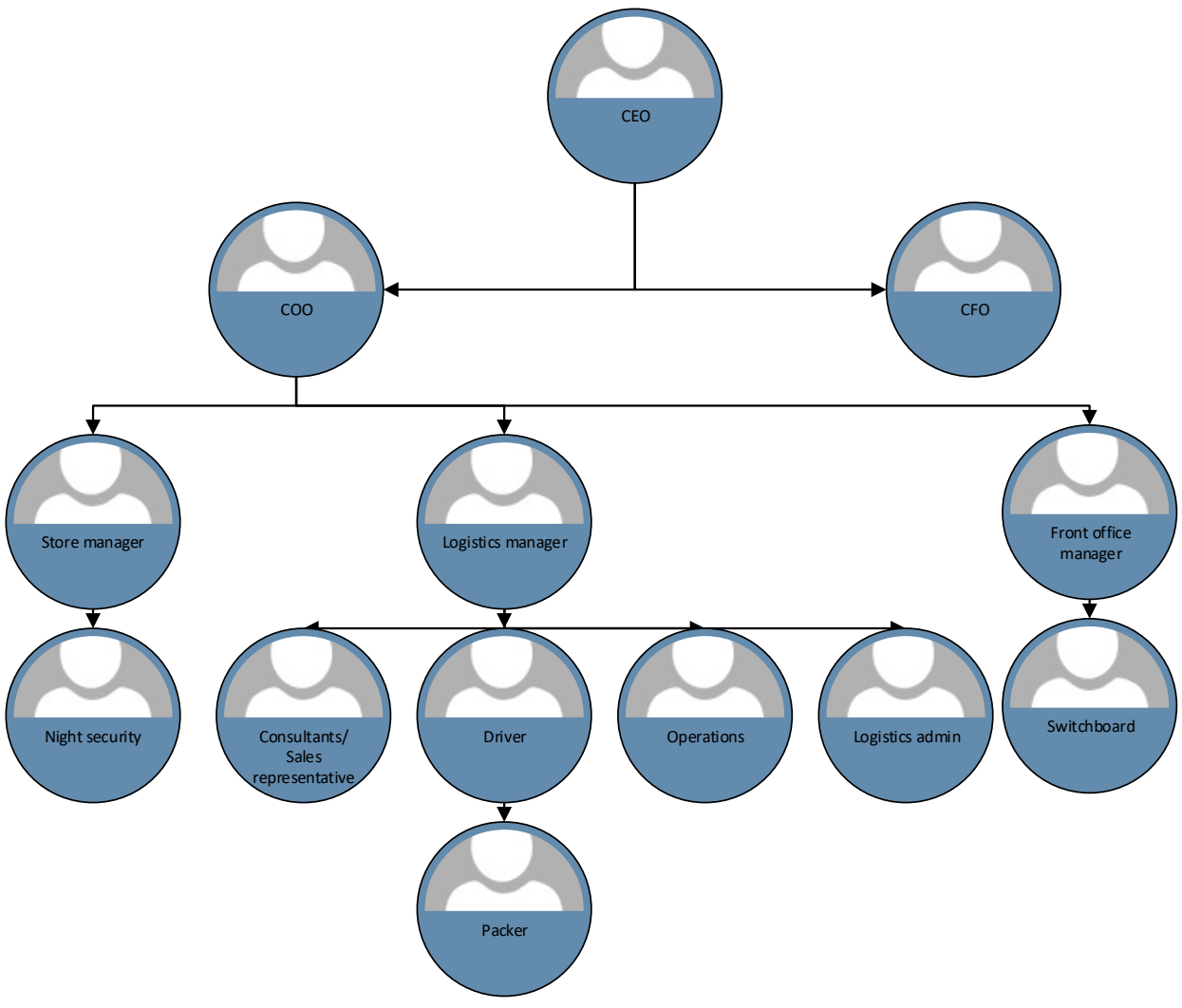
3.1 KPA 1 Accurate documentation of incoming goods

3.2 KPA 2 Preparing vehicles for service

3.3 KPA 3 Reporting any irregularities with incoming vehicles and loads

3.4 KPA 4 Find storage location for incoming goods

4. **Organisational structure**



Role

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Accurately record incoming goods.	- Process model Sec 1
KPA 2	- Preparing vehicles for next day service. Preparation includes cleaning vehicles and packing wrapping material according to wrapping material report.	- Process model Sec 3

Performance Area	Responsibility	Ref:
KPA 3	- Report used/ unused wrapping material and load faults.	- Process model Sec 4
KPA 4	- Find storage location for incoming goods	- Process model Sec 2

5. Deliverables

	Deliverables	Format	Before
Daily	Inventory and store lists	Checked-in	6 AM
	Vehicle readiness check	Checked	6 AM

6. Skills and Education

KPA	Skill
Accurate documentation of incoming goods	2. N/A
Prepare vehicles for service	1. Understand wrapping material report
Report irregularities with vehicles and loads.	1. N/A
Find storage location for incoming goods	1. Understand diary system

7. Competencies (Internal)

Competency	Level
Basic Training	Do
Consultant Training	Informed
Service and Maintenance	Informed
Transport and Logistics	Informed
Procurement	Informed
Customer Satisfaction, Communication and Telephonic Selling	N/A

Measures of success

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
Vehicles clean	Not all leaving for service	Not all leaving for service	All leaving for service	All at depot	All at depot
Basic vehicle readiness	Not all leaving for service	Not all leaving for service	All leaving for service	All at depot	All at depot
Accurate checked -in loads (inaccuracies)	Major inaccuracies	Major inaccuracies	Only minor inaccuracies	Few minor inaccuracies	No inaccuracies

11.9.31 Store admin process model

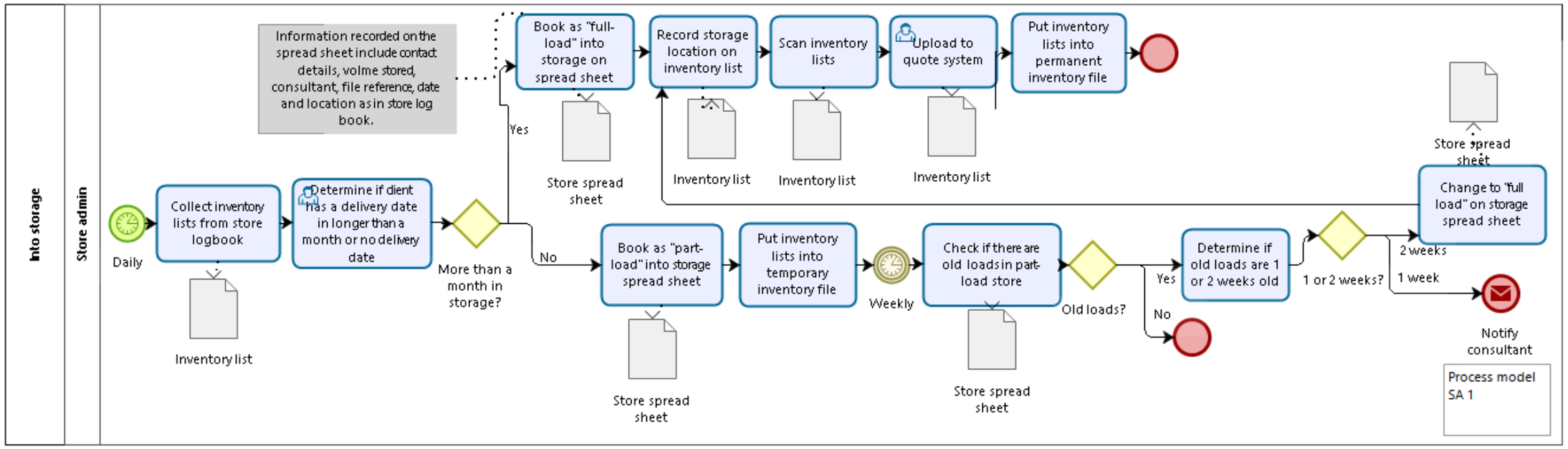


Figure 115: Store admin into storage SA 1

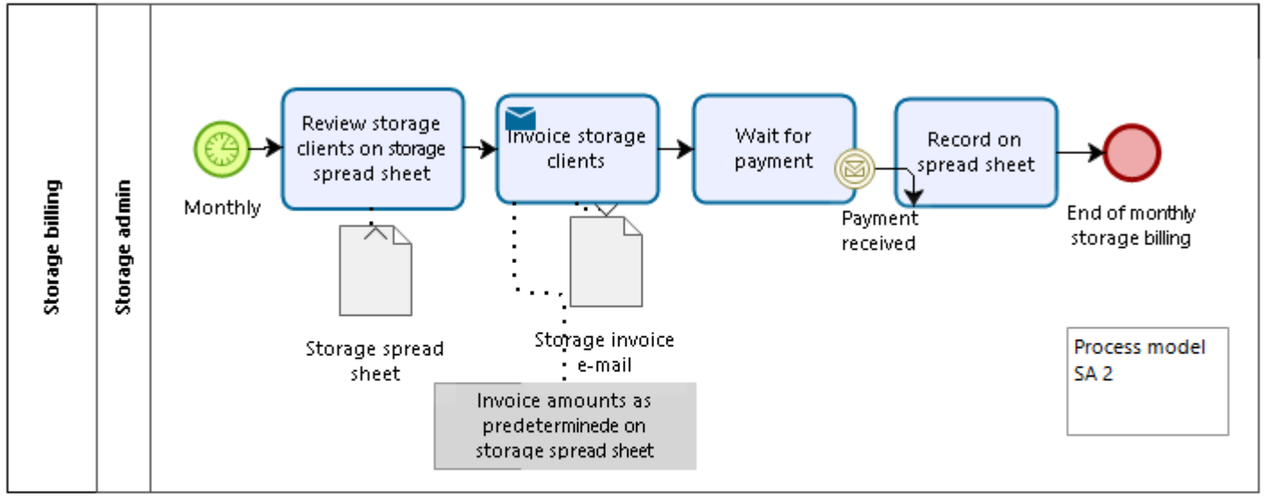


Figure 116: Store admin storage billing SA 2

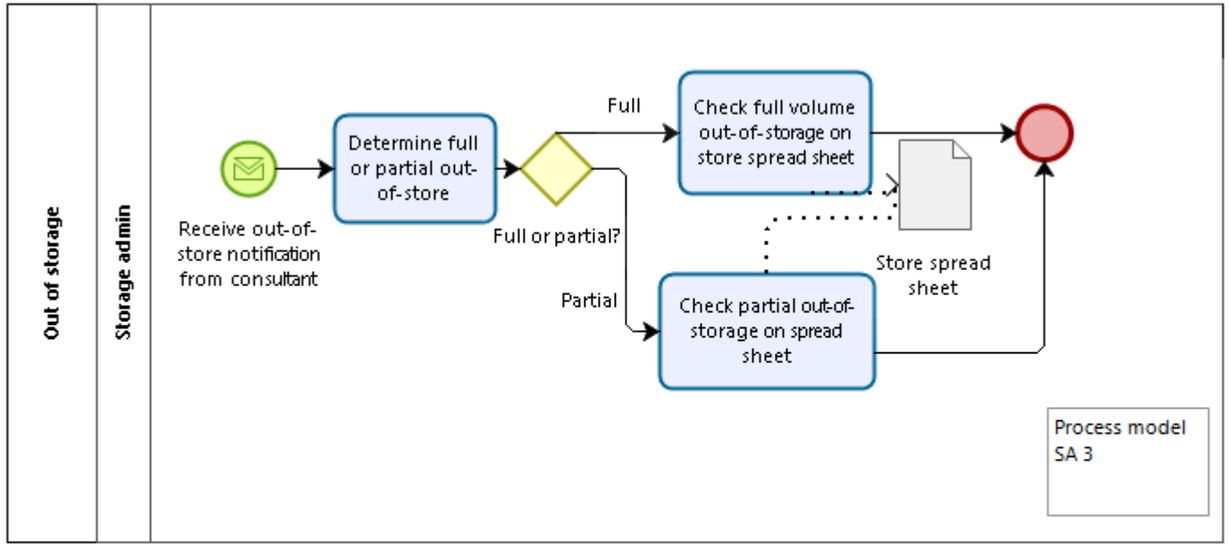


Figure 117: Store admin out of storage SA 3

11.9.32 Storage admin role description

1. **Role**

This role:Storage admin

Reports to:Logistics admin

2. **Purpose**

Administrate storage accounts and inventory lists.

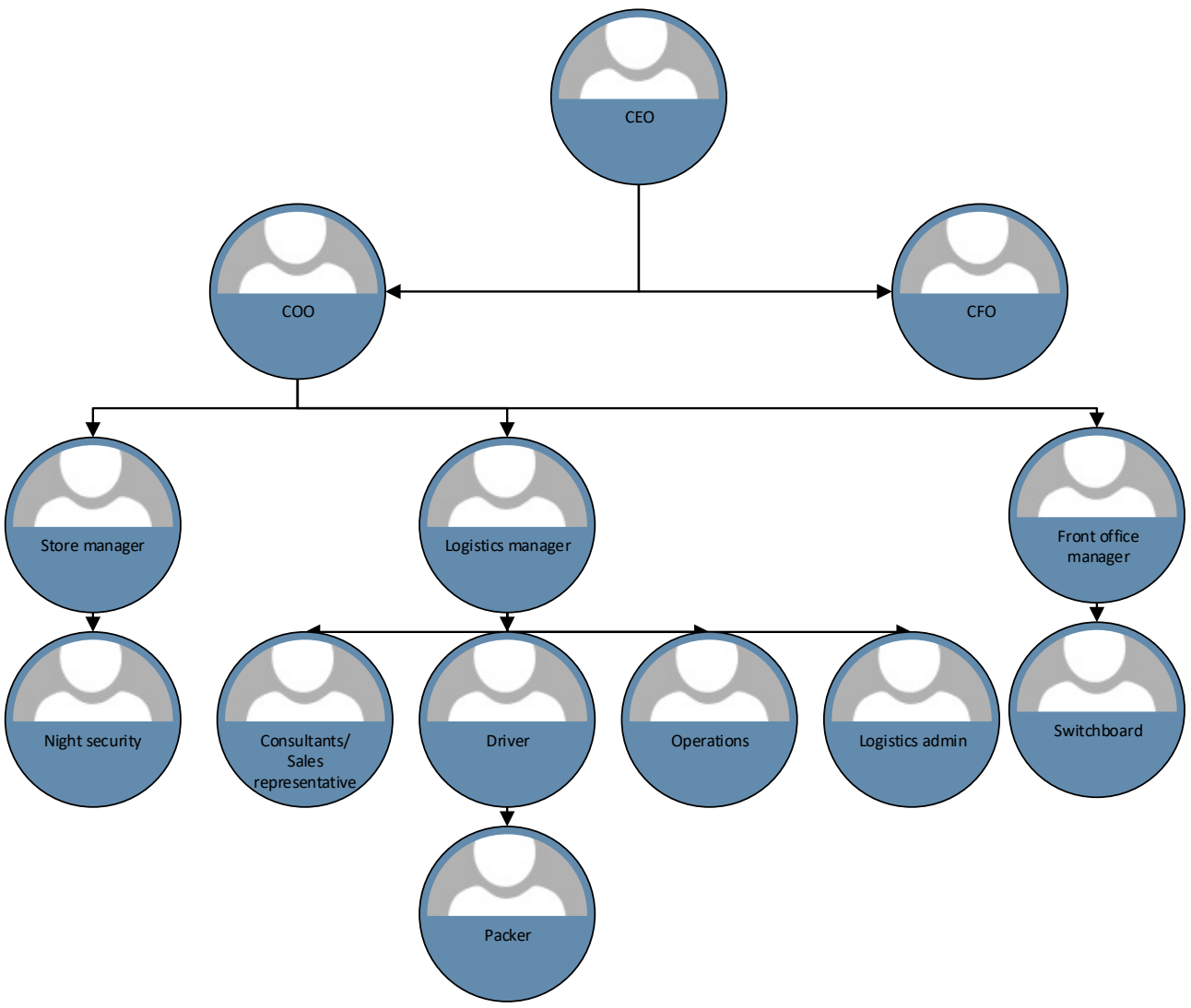
3. **Key performance areas**

3.1 KPA 1 Document storage locations

3.2 KPA 2 Track storage space

3.3 KPA 3 Storage billing

4. **Organisational structure**



5. **Role**

The incumbent is responsible for the following:

Performance Area	Responsibility	Ref:
KPA 1	- Document storage locations on inventory lists and storage spread sheet.	- Process model SA 1 and 3
KPA 2	- Track storage space in storage spread sheet.	- Process model SA 1 and 3

Performance Area	Responsibility	Ref:
KPA 3	- Track storage clients	- Process model SA 2

6. Deliverables

	Deliverables	Format	Before
Monthly	Storage bills	Invoice	Monthly due date

7. Skills and Education

KPA	Skill
Document storage locations	7. Basic computer literacy
Track storage space	1. Basic computer literacy
Storage billing	1. Pastel literacy

8. Competencies (Internal)

Competency	Level
Basic Training	Do
Consultant Training	Informed
Service and Maintenance	Informed
Transport and Logistics	Informed
Procurement	Informed
Customer Satisfaction, Communication and Telephonic Selling	Do

9. Measures of success

Measure	Unacceptable	Below Expectation	Good Work	Great Work	Super Hero
On-time storage billing		Below 100%	100%		
Storage location accuracy		Below 100%	100%		

11.9.33 Store manager process model

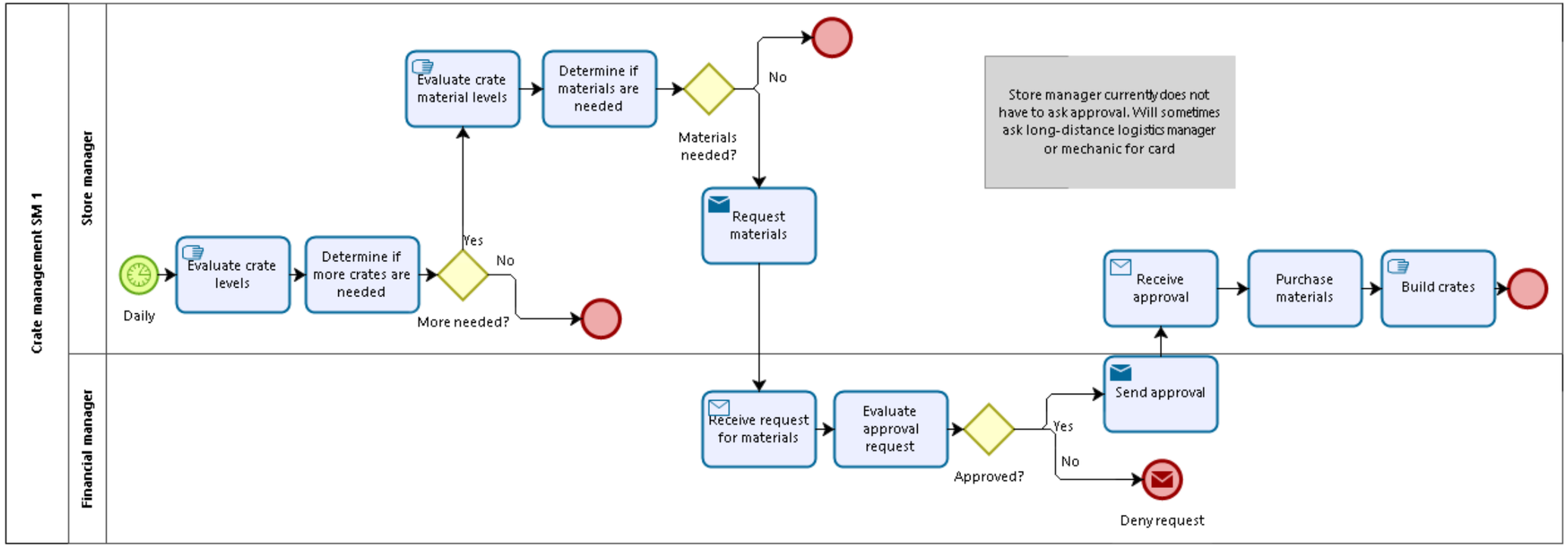


Figure 118: Store manager crate management SM 1

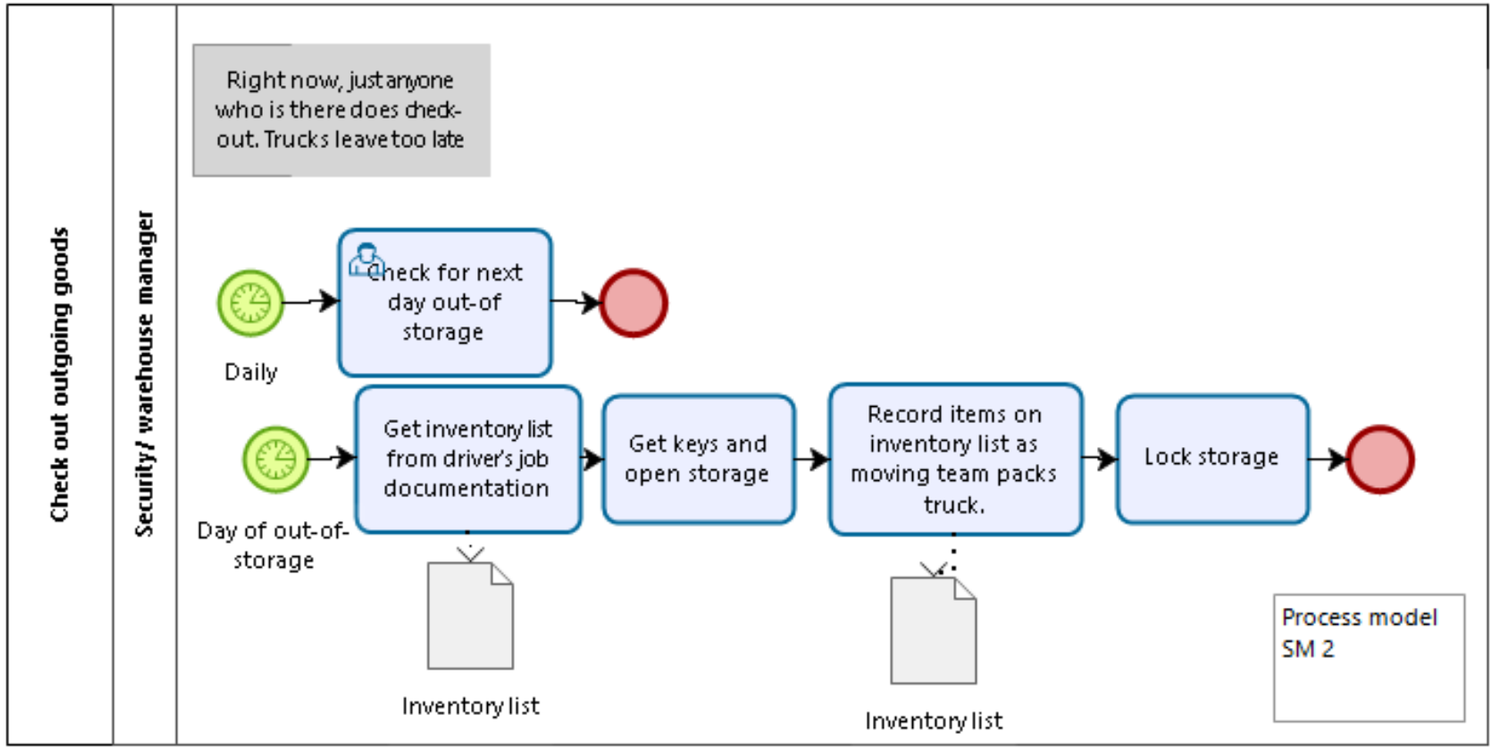


Figure 119: Store manager outgoing goods SM 2

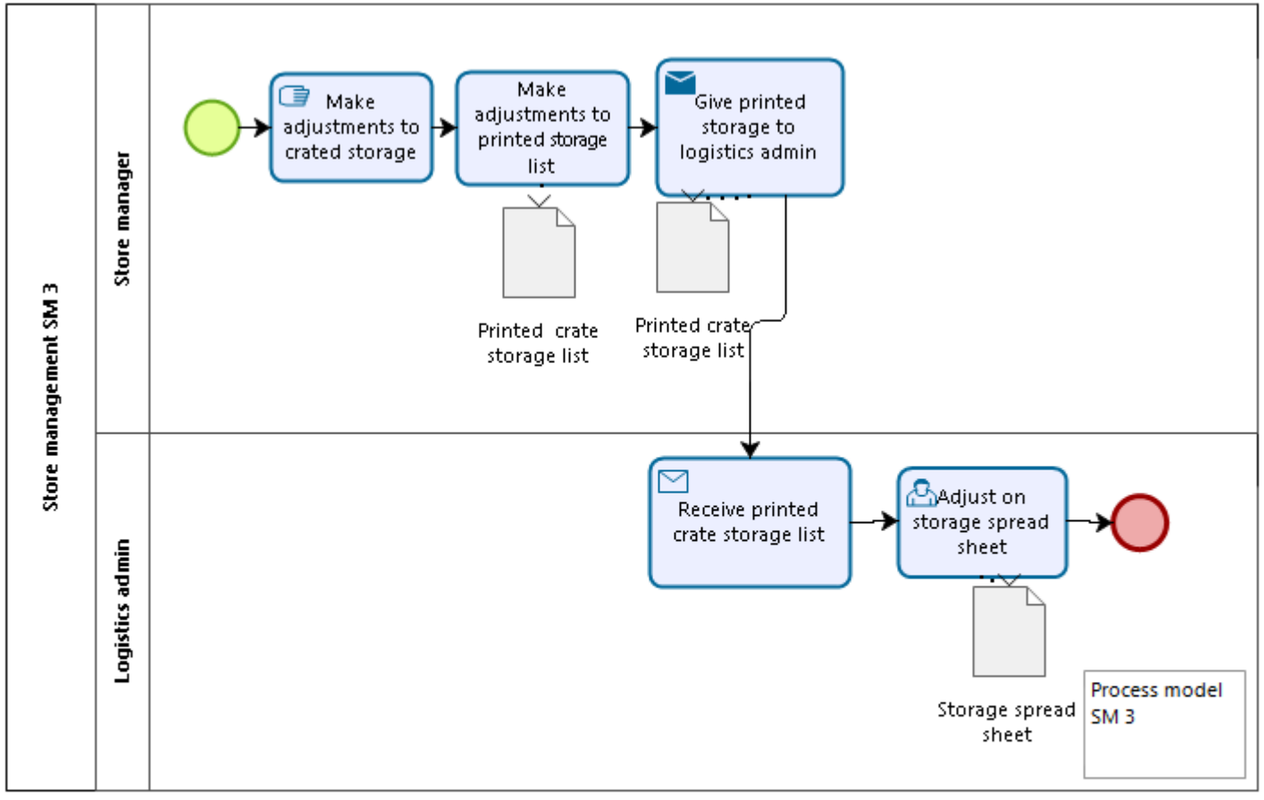


Figure 120: Store manager crate store SM 3

11.9.34 Accounting process model

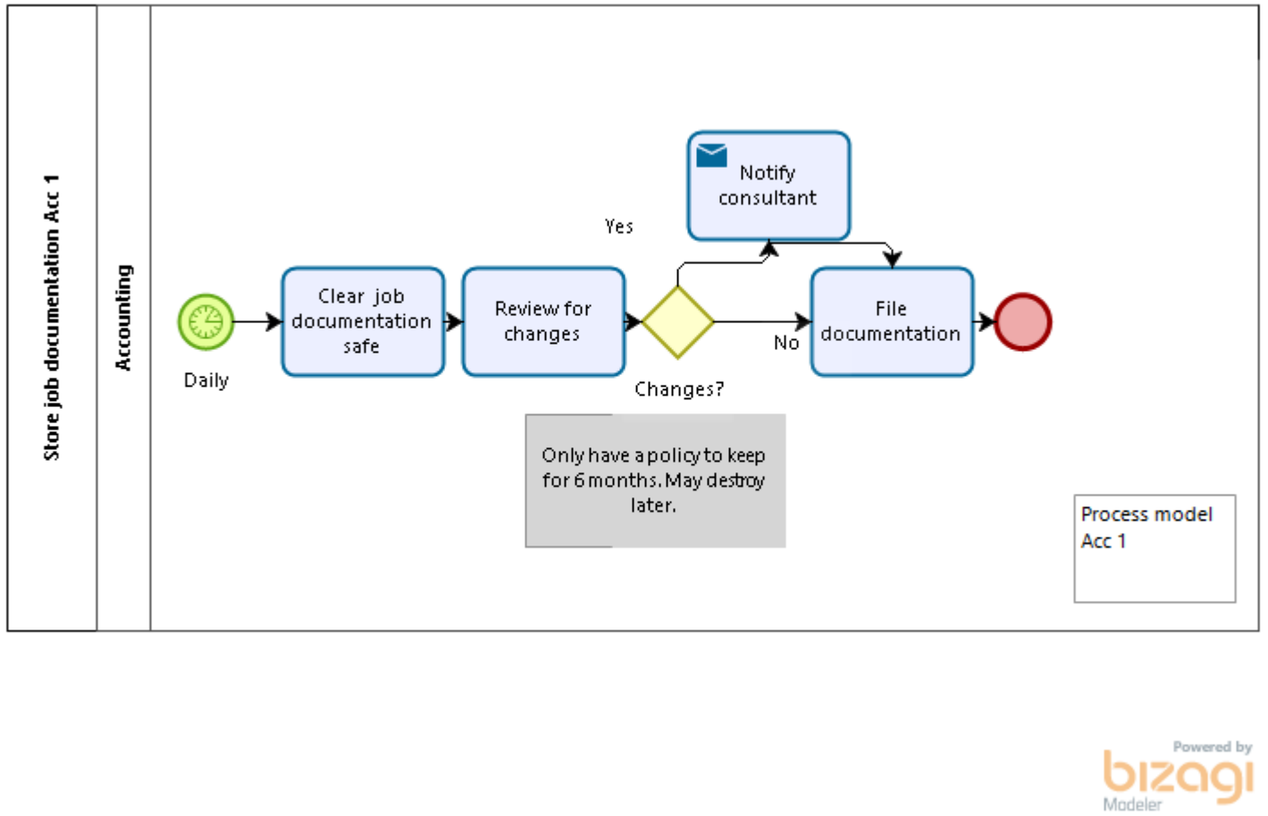


Figure 121: Accounting store job documentation Acc 1

11.9.35 Mechanic process model

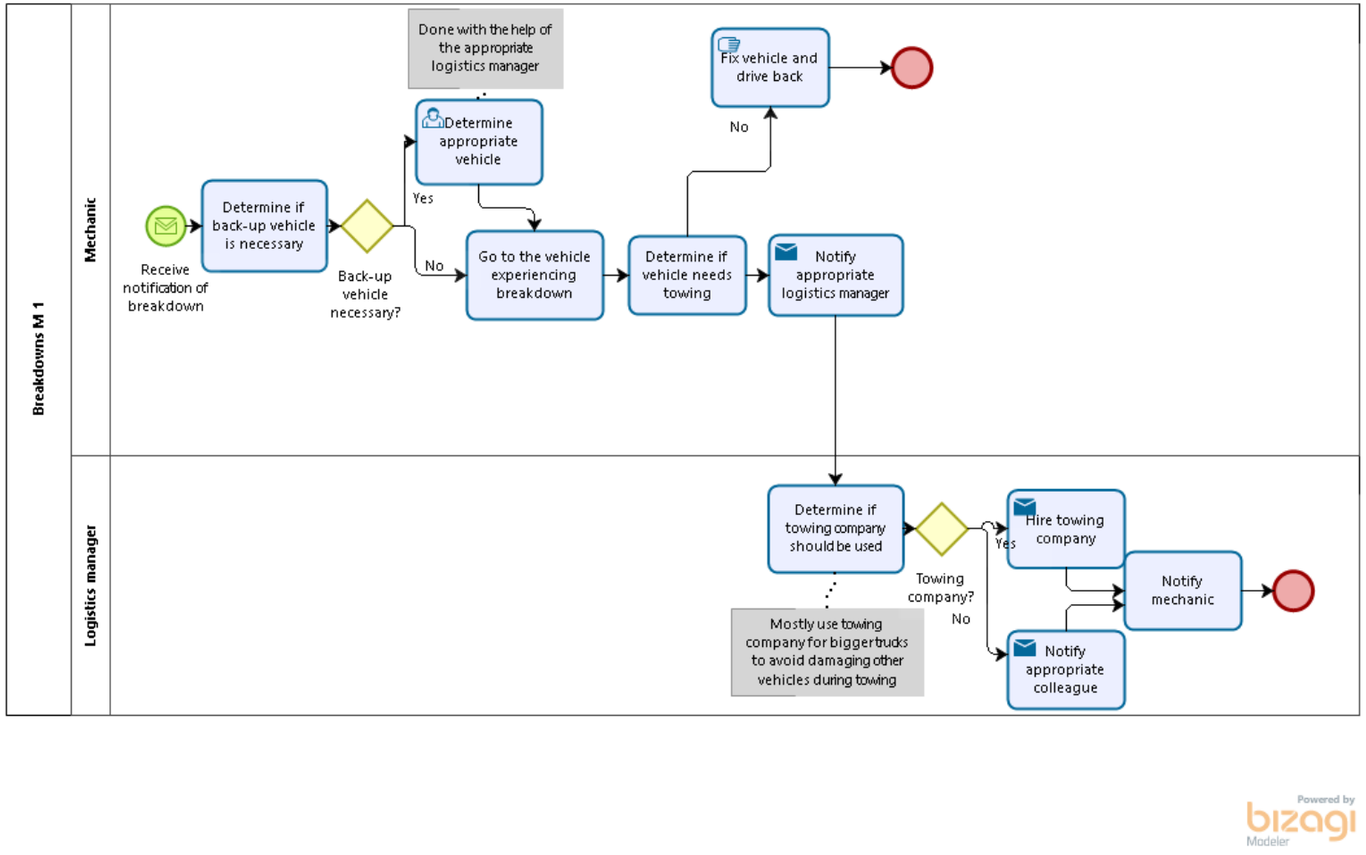


Figure 122: Mechanic breakdowns process model M 1

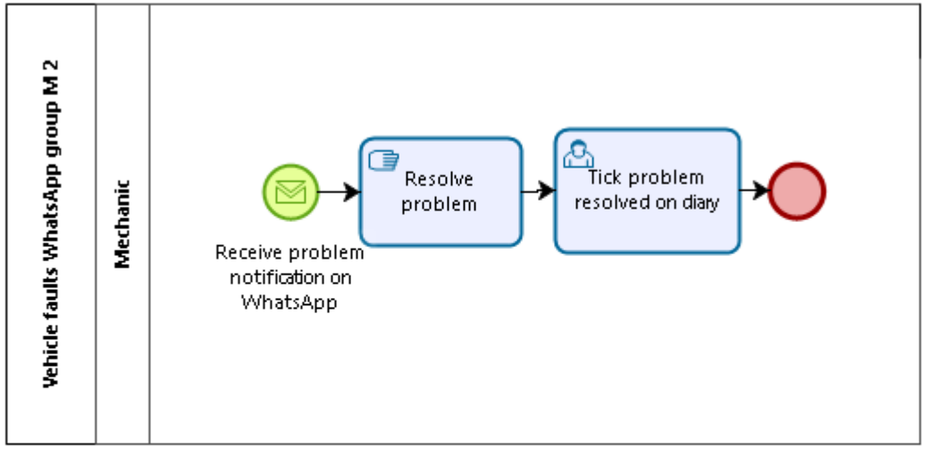


Figure 123: Mechanic vehicle fault notification M 2

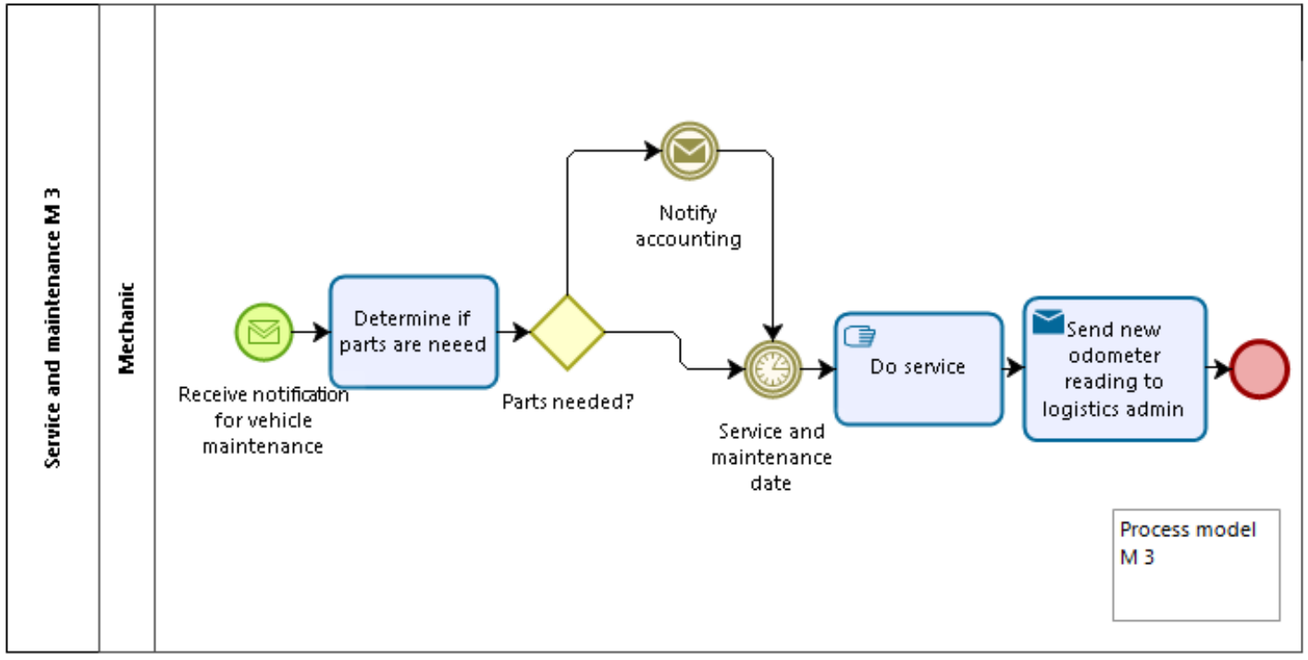


Figure 124: Mechanic service and maintenance M 3