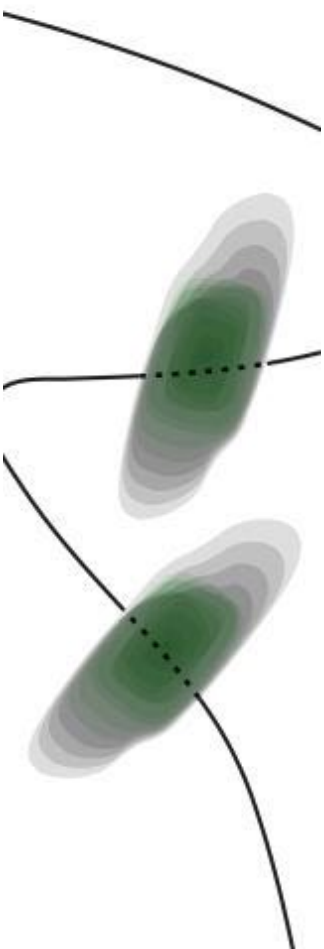




Improving the Client Contact Centre, A BPMN Approach.



UNIVERSITY OF TWENTE.

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Preface

This report is the result of my Bachelor Thesis, concluding my studies of the Bachelor Industrial Engineering and Management at the University of Twente. In my thesis I researched the opportunities and process improvements of a help centre at a company. The results of this are new processes and a new database searching tool.

I am grateful for the opportunity that was given to me by ASG, where they allowed me to develop myself to become a better researcher. A special thanks for my company supervisor, Henk Crone for the weekly meetings, suggestive advice and guidance during the thesis. He was always willing to help prevent foresee upcoming problems and think of solutions with me on the spot. This methodology was shared among the company and I want to thank all of the employees of ASG that helped me.

My gratitude also goes out to the developers of the newly designed system for ASG, who helped put my theoretical ideas into a real tool to be used for the employees.

Lastly, I would like to thank my supervisor at the UT, Renata Guizzardi, who was incredibly extensive in checking my work as well as giving me the right guidance to move forward with the thesis.

Lars van der Toorn,

Delft, July 2022

Management Summary

Adviesgroep Strategisch Gebouwbeheer Nederland (ASG), is a leading data analytical company providing advice on efficient energy usage and installing their own technology for customers to track their heating usage. They are in the process of rapidly expanding their business across the country and want to be prepared to be of best service to their future company with their client contact centre (CCC), of which this thesis has focused its research on.

From interviews with employees within the company, it becomes clear that the processes that they are using can be more optimized to save costs and increase the potential of a satisfied customer. Currently their primary indicator of how their department is given a performance rating is by means of a dashboard included in Zendesk, an application where they handle tickets for their customer service. There it displays their first reply time to their ticket. The goal is to find improvements within their work processes that reduce this first reply time. Thus, the research question that follows is:

How would ASG best optimize the use of Zendesk to have better employee efficiency, and thus a higher customer satisfaction?

To fully answer this question, the research first looked to map these processes, proceeding by creating process improvements. These process improvements were then compared with measurable KPIs that looked at the current and future implementation of the processes.

The research concludes the following:

All processes can be improved by adding a tool that functions as a search database, this would speed up the time to do the process *Desk Research* but also help get a quicker response to customers calling.

Secondly, the creation of tickets should be structurally submitted by non-CCC employees. By having them take calls, they can easily create a ticket so that the employee of the CCC does not have to create a ticket themselves by reading it off a note.

Lastly Zendesk allows the user to create triggers and automations. By using triggers the sorting time for expert employees will take less trivial time and thus opens the possibility to focus on difficult tickets faster. The automations will redirect the focus of tickets being stuck at a newer or experienced employee. This would help ASG increase their response time by giving the customer a timely explanation or speed up the urgency to finish the ticket in the same day.

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Chapter 1 Introduction

This chapter gives a brief introduction of the chosen company as well as provide relevant background information towards the problem it is currently experiencing. Additionally it covers the methodology of this thesis, which can be split into the problem identification and research design.

1.1 Research Context

This work is developed in Adviesgroep Strategisch Gebouwbeheer Nederland (ASG), a company that specializes in providing analytical data on the heating allocation sensors of the radiators in social rental homes around the Netherlands. With these insights they provide consultancy to improve utility consumption which improves sustainability and cost-efficiency. Their headquarters is established in Delft, where they are rapidly expanding to gain a stronger footing in the market. This causes a bigger client userbase, which made them decide to use the Zendesk tool about a year ago to support the Customer Call Center (CCC). By using Zendesk, they answer questions for the billing and functionality of the product they install at the homes of the customers.

ASG desired goal for this thesis is to improve three key point in the way they use Zendesk to connect with the customer, which are:

- Maintaining and increasing customer satisfaction.
- Optimizing the use of Zendesk by the company's employees to improve efficiency in responding to customers' demands.
- Avoiding customers calling back due to confusion or insufficient guidance.

1.2 Research Methodology

This chapter covers the methodology of this thesis, which can be split into the problem identification and research design.

1.2.1 Problem identification

Section 1.2.1.1 presents the scope and background of the problem; and Section 1.2.1.2 discusses the problem-cluster with the acquired core problem.

1.2.1.1 Scope and background

The company currently aims to keep expanding at a rapid rate. To benchmark their growth, they want to keep their current and new customers satisfied. Since the company works for housing corporations, the way they keep those clients from leaving is by keeping them happy.

Aiming at pleasing clients, ASG invested resources into a team called CCC. This team's main goal is to achieve an efficient and smooth way for those residents to contact the company if they have questions or issues with their products. The scope of this research is to investigate and improve the functionality of this team. The company switched to Zendesk 15 months ago. They previously used Excel to keep track of consumer issues. The team currently knows that they can improve their usage of the tool and would like the researcher of this thesis to advise them on this usage so they may be more effective.

The Zendesk tool currently offers some insights on the overall and individual performance of the employees. The primary data indicator that is important for the company is the First Reply Time (FRT). Because the Zendesk tool is not yet being fully explored, the administration process could be optimized. An action problem is the discrepancy between norm and reality as perceived by the problem owner. Whereas the norm in this case is the optimization of the Zendesk ticketing tool, while the reality lies in the fact that as soon as a complex problem arises, it is taken manually outside of the system.

1.2.1.2 Problem cluster

To find the core problem and its causes, a problem cluster was made and is shown in Figure 1. According to Heerkens and Winden (2017), this model identifies the core problem.

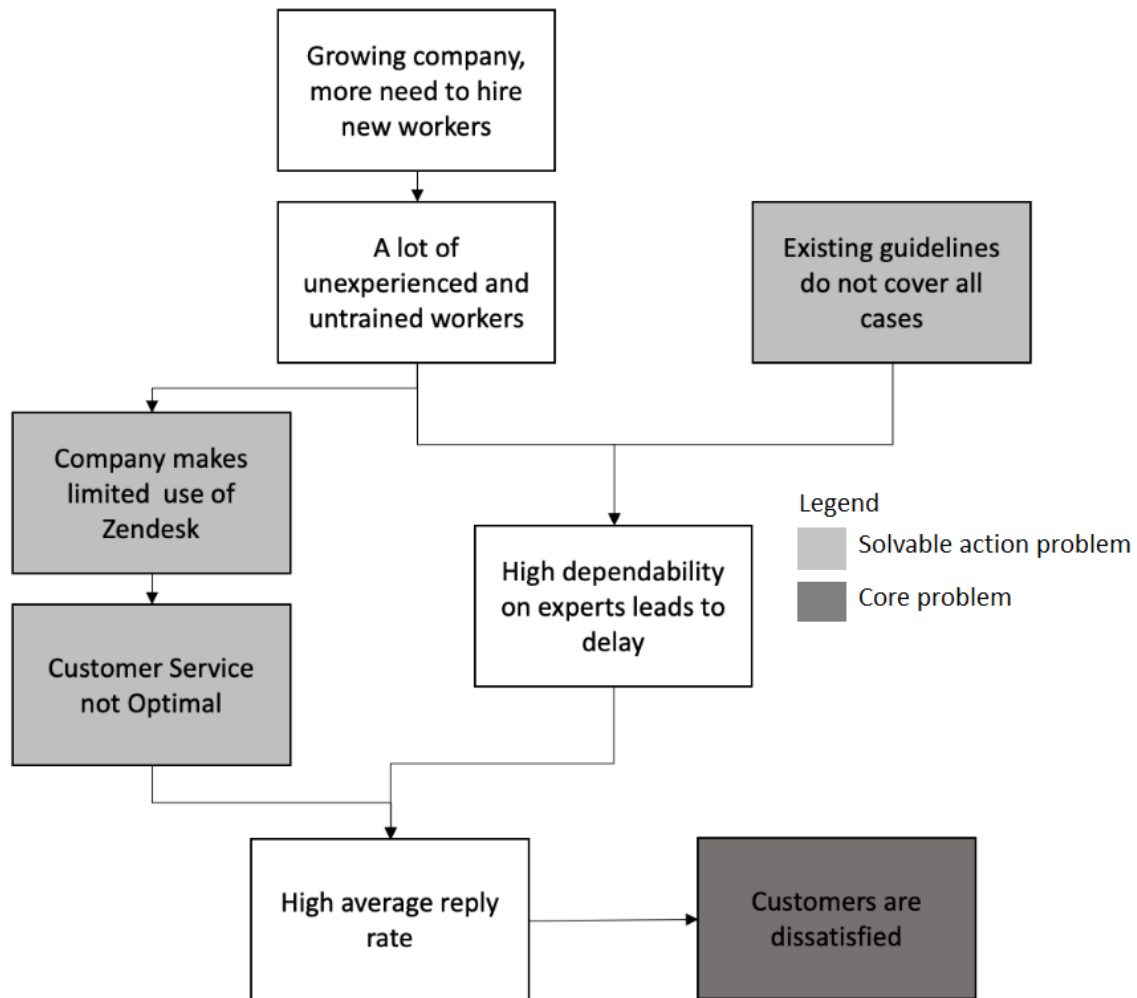


Figure 1: The problem cluster

When looking at the reason why customers are unsatisfied, we see this relates to a long FRT. The long reply time deviated between 105 to 120 hours per ticket, which according to their current standards falls just barely in their 5-day reply time. However, the goal here is to have an average reply rate of 72 hours. Also, complex problems result in the need of having a more expert employee to look at the problem, and experts are not often available to find a solution. When backtracking and looking as to why these complex problems arise, we see that they are caused by the staff's inexperience to deal with problems that fall out of their guidelines, as well as the staff not being well-trained enough to start using the program fully. Thus, the reason why the use of the tool has not been optimized yet is that employees haven't dared to experiment with all the options. Moreover, keeping the status quo is good enough and they do not expect to grow. In other words, employees do not feel the need to deviate from their way of doing work, and hence Zendesk keeps being underused.

1.2.1.3 Core problem

The core problem states:

Customers are dissatisfied

This core problem arises from the given problem cluster, being the lack of proper guidance for new employees on the use of Zendesk, as well as the complexity of the problems they need to solve. If this problem persists, the company will likely try to solve this problem by hiring more staff, which would only solve the issue in the short run, due to the ever-expanding growth of customers.

1.3 Research design

The research approach will be done using the seven steps of the MPSM guidelines provided by Heerkens and Winden (2017). The steps are displayed in figure 2.

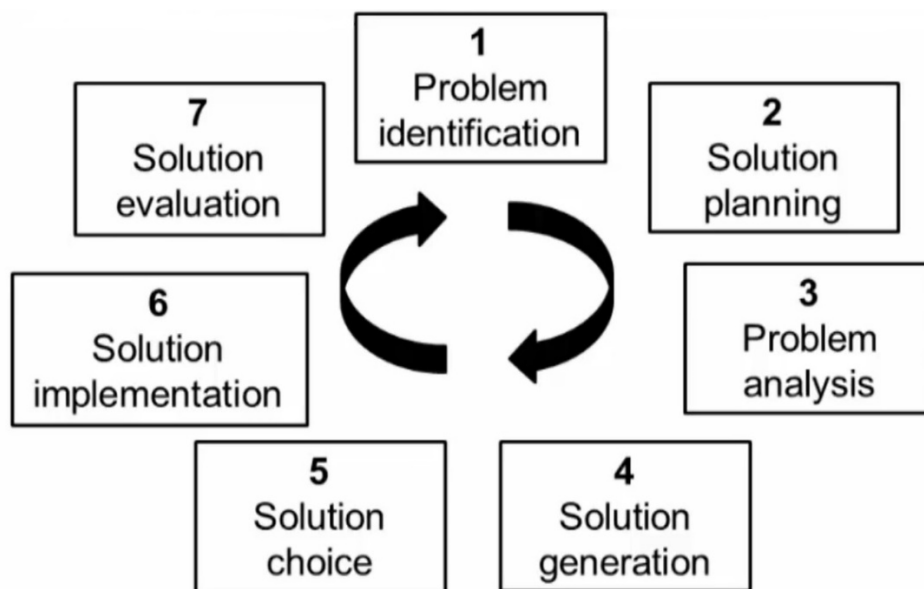


Figure 2: The MPSM steps (Heerkens et al., 2021)

The “Problem identification” phase has been discussed in Section 1.2.1. The proceeding stages will be elaborated below.

1.3.1 Solution planning

The “*Solution planning*” phase will be covered in this section, aiming at eventually finding a way to answer the core problem.

1.3.1.1 Phase 3: Problem analysis

The problem analysis needs to be done by gathering knowledge on the problem. Fortunately, Zendesk gathers factual data based on the results, which currently include the FRT and individual ticket solving per employee. To get more contextual data for the current situation, old excel documents will be used to provide data on customer groups, question category quantities, call duration and call frequencies.

1.3.1.2 Phase 4 & 5: Solution generation & choice

A literature study (SLR) is conducted to determine what can be improved of the Zendesk tool, and to look at which possible assistance tools can be developed to make the use of Zendesk a better experience. The methods and theories can be qualitatively analyzed, from which we will take the most suitable method along with the constraints given by the company. The company aims to immediately implement the selected method.

1.3.1.3 Phase 6: Solution implementation

After the appropriate method is created, we shall determine how to implement and evaluate it along the given limitations. The given method will be designed using a Business Process Management (BPM) methodology. From the given method, an advice will be given so that we can adjust Zendesk to become a better program for the employees. The method will also be explained to all the staff so they can see improvements themselves.

1.3.1.4 Phase 7: Solution evaluation

After implementing the proposed method in ASG, an analysis will be made on eventual changes regarding the FTR. Here the effects of the changes are analyzed and compared over time with the older results. The result of this analysis will be later presented to ASG and will serve as basis for advice on how the CCC work may be improved. Lastly, a conclusion and a recommendation on future work at ASG will be presented both to the company and the university.

1.3.2 Research Questions and Design

The core problem of ASG can be described into the main research question which goes as follows:

How would ASG best optimize the use of Zendesk to have better employee efficiency, and thus a higher customer satisfaction?

To make this question answerable, sub-questions have been made based on the stages of the MPSM covered in section 1.2.1. The sub-questions with their importance are explained below:

1. *What factors contribute to the first reply rate?*
Since one of the key variables is this FRT, it is important to note what factors influence this variable on a daily basis. This is to reflect the first stage of the research approach to get a better grip on the current situation. The efficiency of the Zendesk tool should tell us how the performance of ASG is doing.
2. *What BPM methods and theories can improve employees' efficiency while using Zendesk?*
To get more knowledge on the second stage of the research approach, we need to identify the BPM methods and theories that could be used to propose a solution, that is, a method to support A.S.G employees to better use Zendesk. This is also used to give a theoretical framework of the thesis.
3. *How to best implement the selected method into ASG, taking the organization's characteristics and limitations into account?*
Following the second stage, this question reflects the third stage of the research approach. The most suitable methods need to be implemented, to allow it to be observed and researched. An implementation and a design plan will be made to ensure smooth transitioning from the current to the proposed approach. This question aims to improve the core problem explained in section 1.2.1.
4. *How does the implementation of the proposed method affect the FTR?*
After implementing the proposed method, an analysis must be made. This analysis is of great importance to make a comparison between the new and old situation. Moreover, the effect of the chosen BPM process should show the optimization of the use of the Zendesk tool.
5. *What conclusions and recommendations can be made after conducting the thesis at ASG?*
The last knowledge question reflects the sixth stage of the research approach. To ensure that future work can be done, we aim at drawing some conclusions on the work done and to recommend some further works. These conclusions and recommendations will give insights to make improvements to the company.

The above knowledge questions have been transformed into a research design, see table 1, stating the type of research, research population, how the data is gathered and what kind of data analysis would be used.

Research question	Research type	Research group	Data gathering	Data analysis
<i>What factors contribute to the first reply rate?</i>	Descriptive	Employees of the CCC	Primary resource analysis and interviews	Mixed
<i>What BPM methods and theories can improve employees' efficiency while using Zendesk?</i>	Exploratory	N/A	Literature study	Qualitative
<i>How to best implement the selected method into ASG, taking the organization's characteristics and limitations into account?</i>	Explanatory, Experimental	Employees of the CCC	Zendesk performance tool and interviews	Mixed
<i>How does the implementation of the proposed method affect the FTR?</i>	Descriptive	Employees of the CCC	Primary resource analysis and interviews	Mixed
<i>What conclusions and recommendations can be made after conducting the thesis at ASG?</i>	N/A	N/A	N/A	N/A

Table 1: Knowledge questions

1.3.3 Limitations

Given that the research will take place within a 10-week period to solve the action and core problem of the company, some limitations have been put into place to ensure completion.

1. **Key Performance Indicators (KPIs)**

The desired and optimal method must be based on relevant KPI's selected for this research, with the primary example being the FRT. The exploration of the KPI are done in chapter 3

2. **Limiting interview length**

To make sure that the interview structure and answers do not deviate from one another, the answers will be streamlined to feedback that can be easily quantifiable. Considering that this thesis also tends to improve complex problems, the solutions for it should be broken down in simpler steps that can be implemented into a BPM model.'

1.3.4 Deliverables

At the end of this bachelor thesis at ASG, the following will be delivered, based on the knowledge questions described in section 1.3.2:

1. A Business process modeling notation, that registers flow of activities showing all the gateways that administers the time processes of each step required when working for the customer call center.

2. Theoretical framework based on a literature study and on a review of the relevant functionalities of the Zendesk tool

3. A BPM model that should make the administration process more efficient

4. Advice to improve the use of the Zendesk tool

5. Conclusion and recommendations for future work.

1.3.5 Thesis structure

Following chapter 1, chapter 2, will explain the theory required and researched for this thesis.

Chapter 3 captures the current situation. Once the process is captured we will analyze the noticeable issues of the process and look for factors that can be measured and improved.

Chapter 4 will look at the solution and improvement generation, by creating newly improved models as well as new guidelines that fit in with the company.

Chapter 5 then validates the proposed solution as well as tests changes that can be readily implemented.

Lastly, in chapter 6 the conclusion is drawn as well as a recommendation for the company.

Chapter 2 Theoretical Framework

To have a better understanding of the research study it is important to lay a foundation known as the theoretical framework. This will serve as the structure and support rationale for the study, the problem statement, the purpose, the significance, and the research questions (University of Colorado-Denver et al., 2014). A systematic literature review (SLR), which can be found in Appendix A is made around the following research question:

What BPM methods and theories can improve employees' efficiency while using Zendesk?

The SLR yielded some methodologies and theories to help understand the importance of the research question. It is important to note the stakeholder in this situation, namely ASG, which wants to expand their operations with the current application Zendesk, so a tool needs to be developed that can be used in synergy with it. We first discuss the need and definition of BPM for the research project, followed by the applicable methods that are relevant for the thesis.

2.1 Business Process Management

Business Process Management (BPM) focuses on optimizing processes through standardization and automation (Davenport, 1993, as cited in Voigt et al., 2013). BPM is still predominantly implemented with an internal focus. All too often an inside-out approach is adopted that ignores enterprise strategic intent and customer value creation (Burlton, 2010, as cited in Trkman et al., 2015). The need for ASG to make applicable use of this is necessary to improve their current setup in dealing with customers. When looking into different methodologies for BPM that are applicable for this study we come up with the following: customer relationship management (CRM), business process modeling notation (BPMN), business process redesign (BPR), and Service Blueprinting. We will briefly look into what each of these approaches mean, followed by a preferred selection.

2.1.1 Customer Relationship Management

CRM is an example of business process management (BPM) approach that integrates people, processes, and technology to understand a company's customers, and manages customer relationships to retain existing profitable and valuable customers (Lau et al., 2016). Companies that manage to successfully implement CRM with a company-wide, cross-functional, customer-focussed business process re-engineering approach benefit from increased customer loyalty and profitability. This is how companies can sustain a competitive advantage, especially in today's hypercompetitive, global, dynamic, and turbulent business environment (Lau et al., 2016). Here, BPM aims to improve and manage organisational processes in order to provide maximum value to the customer. (Trkman et al., 2015). ASG prides itself in maintaining a good relationship with their customers, so thinking of ways to increase this is a priority.

2.1.2 Business Process Modelling Notation (BPMN)

BPMN is known as a general purpose modeling approach (for any process), used by several companies to analyse and document their business processes (Kazemzadeh et al., 2015). BPMN nowadays has a current 2.0 version which incorporates choreography and conversation diagrams into process models (White & Miers, 2008). Creating a model around the processes that need to be

done by the contact centre can help ASG see how Zendesk can support them to improve their service with the customer.

Figure 2 illustrates a BPMN model, depicting the flow of activities conducted to provide customer service in an organization.

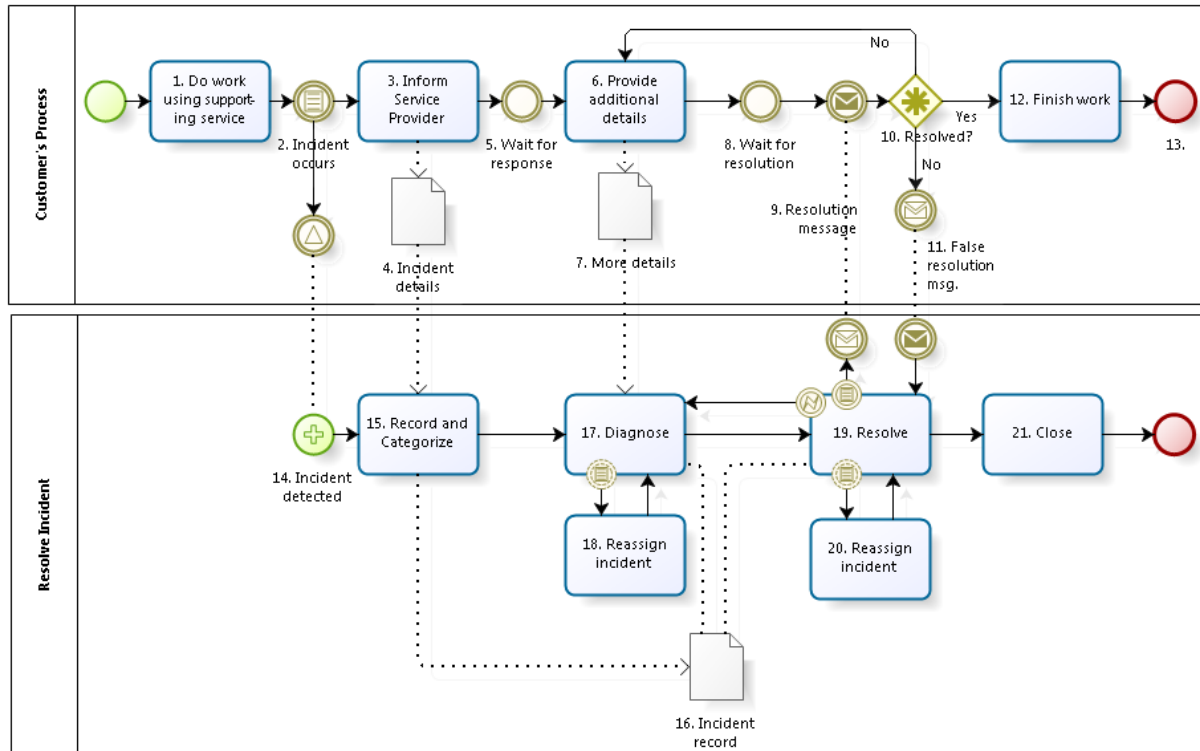


Figure 2: A BPMN model relating to customer service (Falkowitz, 2016)

2.1.3 Business Process Redesign

BPR aims around the practices of Business Process Improvement (BPI) and Business process reengineering, which will lead to continuous improvement process mindset. According to Amrit (2014), with BPR it is possible to make fundamental changes to a company. It looks at multiple perspectives including costs, speed, service and quality. This is to involve the main goal of improving the company a whole.

The relevance of BPR for ASG is clear when you take an important principal of BPR; it tries to innovate processes with a customer centered focus. With this, IT is used to recreate processes, that make the delivering of data more efficient as well as remove significant errors.

2.1.4 Service Blueprinting

Service blueprinting is a domain specific modeling approach (for service processes), designed by service marketers to address challenges and difficulties regarding the interaction of the customer with the service provider (Kazemzadeh et al., 2015). Service blueprints are easy to understand, and all stakeholders (customers, organization's employees and managers) can communicate with them. A service blueprint examines customer interactions with a service company including interaction with individuals or technologies (e.g., websites), and is best created through cross-functional teams and customers (Bitner et al., 2008, as cited in Kazemzadeh et al., 2015). Following the road of the customer and see what gives them a bottleneck could help provide ASG a method to let them overcome that barrier.

Figure 3 depicts the Service Blueprint for a new customer in a service that provides a service for a technician company that also allows for a customer service system.

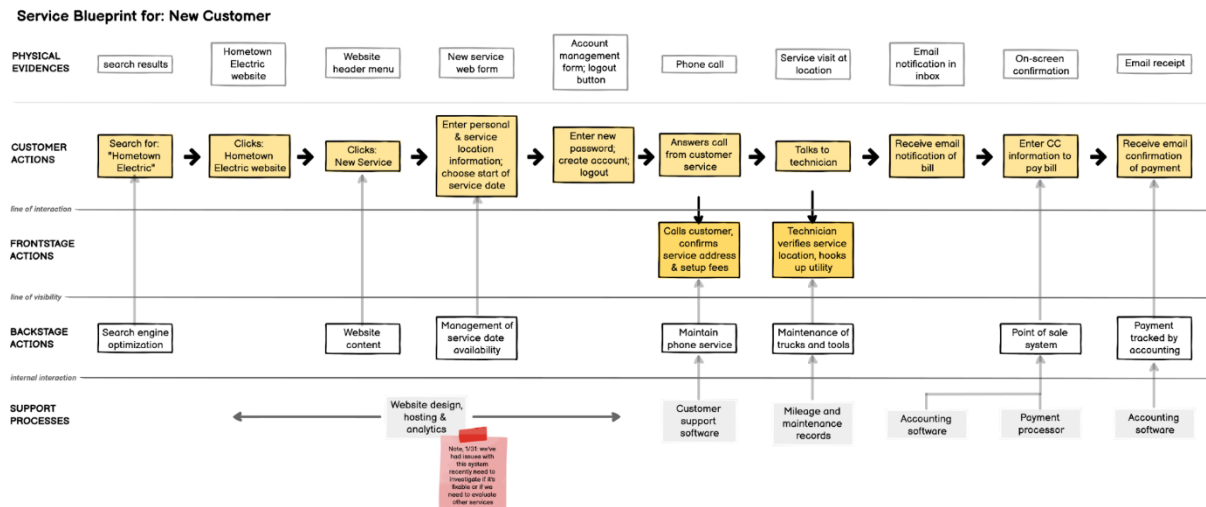


Figure 3: A Service Blueprinting model (Theis, n.d.)

2.2 Method preference

Applying BPMN whilst using the mindset of CRM, and conducting business process redesign seems like the best method to improve the use ASG makes of Zendesk to provide quicker and better customer contact. Service Blueprinting could be a great alternative if the company had more cross-functional teams for Zendesk, however they are currently splitting departments that work the tool to focus primarily on customer support.

To create a BPMN model, we first look at the best methodology to establish the current situation and map out all the existing processes. Furthermore, through interviews we determine the preferred improvements wanted by the employees of the company, having in mind the theories of CRM and BPR.

2.3 Focusing on BPMN

Now that the proposed method is established, a roadmap is created to best implement this process, this will help establish the third knowledge question:

How to best implement the selected method into ASG, taking the organization's characteristics and limitations into account?

Figure 4 presents the steps of the BPR method we adopt in this thesis. The goal is to capture and redesign the current process that employees are working with at CCC. This is a BPR methodology and BPMN is a primary tool to use in this process. To capture and redesign the current process we need to look at the basis of a good model in BPMN.

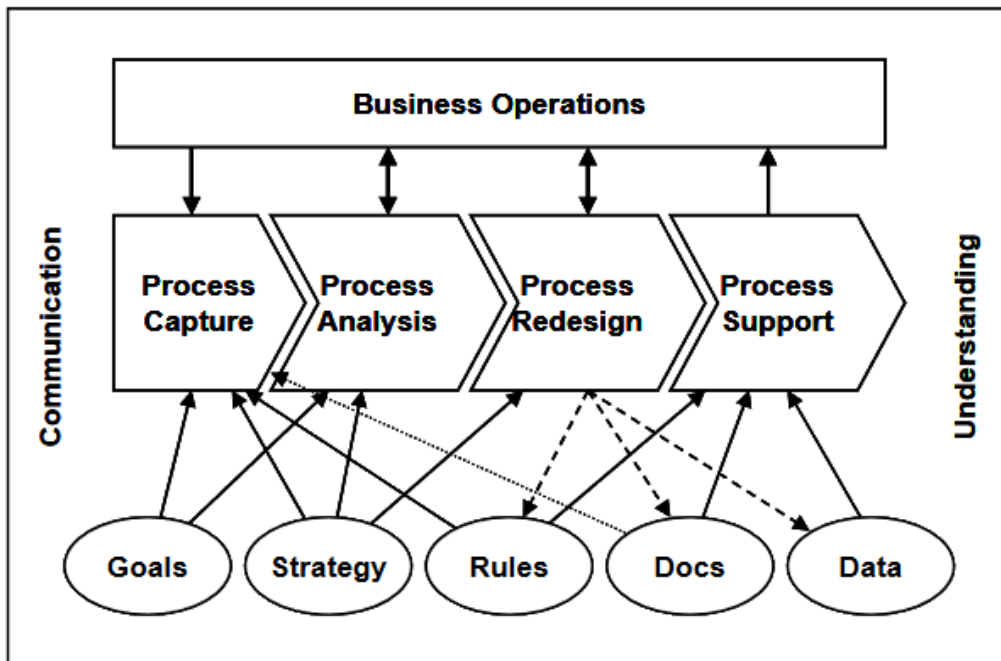


Figure 4: Process Models in all phases of organizational change (White and Miers, 2008)

2.3.1 Modeling options

In developing BPMN it is perceived that there are different levels of process modeling according to White and Miers (2008), these are:

- Process Maps— simple flow-charts of the activities; a flow diagram without expanding details other than the names of the activities and perhaps the broad decision conditions. Used to get a quick overview.
- Process Descriptions—provide more extensive information on the process, such as the people involved in performing the process (roles), the data, information and so forth.
- Process Models—detailed flow-charts encompassing sufficient information such that the process is amenable to analysis and simulation. Moreover, this more detailed style of model would also enable either direct execution of the model or import into other tools that could execute that process (with further work).

The best approach for this thesis is the use of a process model. With this choice, we now examine the requirements for a good process model (White and Miers, 2008):

- Salient— Relevant to the real world
- Accurate— Portray the actual state of affairs, without bias.
- Complete yet Parsimonious— The model cannot be further simplified yet is displayed as easy to understand.
- Understandable— The model should allow readers to make sense of it.
- Predictive— The model should predict present and future
- Falsifiable— The model should be formulated in way that it can be tested on the model's accuracy and predictive power
- Productive— the model should display effective action

For BPMN, the primary goals are to make the model easy to use for the business user and business analyst, and have executable processes (White and Miers, 2008). Therefore, BPMN is structured with

a small set of elements that have distinctive shapes that are designed to show specialized purposes, which then each carry further information that other elements can support (see 3.4.1).

2.3.2 Diagram choice

The implementation of BPMN-modeling differs per company and on the company size, “In a small organization, this is relatively easy to do since employees tend to share a common culture and a shared set of values.” (White and Miers, 2008, p. 22). The model is chosen from the three different categories in BPMN, which are orchestration choreography and collaboration. This thesis will chose to focus on the third method, since it allows the researcher to convey the most information.

2.3.2.1 Collaboration

Collaboration has a specific meaning in BPMN. Where a choreography defines the ordered set (a protocol) of interactions between participants, a collaboration simply shows the participants and their interactions, it may contain a choreography and at least one orchestration. Additionally, a collaboration is any BPMN diagram that contains two or more participants as shown by Pools (White and Miers, 2008). The Pools have Message Flow between them as seen in *Figure 5*.

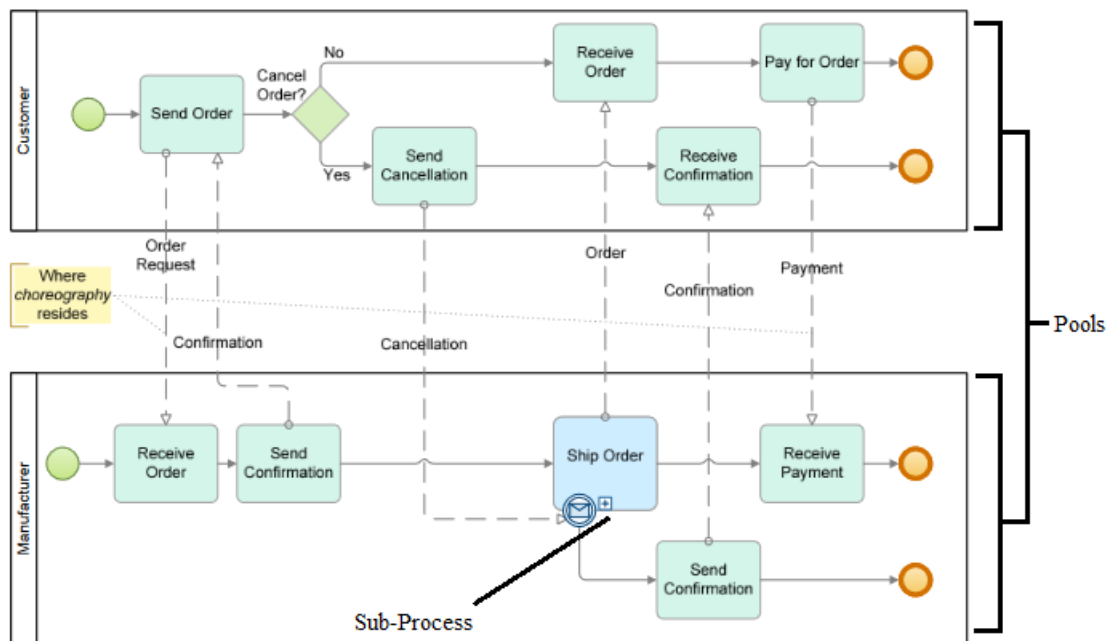


Figure 5: Displaying collaboration within a model (White and Miers, 2008).

Since the development of Zendesk in coordination with the CCC is no longer a pilot project, we need to capture the current process in expanded detail. It is required to create parent processes and sub-processes, include the expected behavior between participants, make use of looping and include conditional events. To ensure specific information flows, the best possible process we can model is the collaborative diagram.

2.4 BPR Validation Approach

Now that the right modelling approach has been selected, we need to look at a further way to assess the redesign, since ASG is primarily interested in the improvement of their processes and performance, the KPIs that are measured need a methodology to become relevant, thus we shall use the *Balanced Scorecard* methodology (Cretu, Gheonea and Ivan, 2015).

2.4.1 BPR Balanced Scorecard (BSC)

The chosen KPIs for this thesis need to be accurately viable and logical to be relevant for the assessment of the created model. This guides the path for the fourth knowledge question:

How does the implementation of the proposed method affect the FTR?

This is done through means of the Balanced Scorecard. The Balanced Scorecard concept involves grouping key performance indicators (KPIs), financial and nonfinancial, in four perspectives (Cretu et al., 2015). We will look at each of these and assess the importance for ASG.

2.4.2 Financial perspective

The Financial aspect displays the results of the financial terms. Any organization calculates and uses financial indicators, but this does not automatically ensure utility in making current decisions or in explaining the performance through current actions. The main feature of the financial indicators is that they measure the past data and what is easy to measure. (Cretu et al., 2015). The CCC does not make revenue but does have financial cost depending on how much time an employee needs to work in the department.

2.4.2 Customers perspective

The customer perspective for ASG refers to the organization's ability to provide service of good quality, in a way as to please the customer, resulting in their final satisfaction. (Şandor & Raboca, 2004). Since the customers that call the CCC of ASG are all treated equally and in most cases do not have a diversification in priority, the best approach for them is a quick response time alongside being having high transparency.

2.4.3 Internal processes perspective

Internal perspective refers to the analysis of the internal processes of the organization, what needs to be done in order to achieve the desired results. For this we use the identified key processes and monitor them continuously so that we know where we stand (Şandor & Raboca, 2004).

2.4.4 Learning and Growth perspective

Innovation and learning capacity of the organization is an essential part when it comes to maintaining the current state of facts, the improvement it has in a dynamic environment. Learning and innovation are not factual elements, quantifiable; therefore, they are troublesome to assess and measure, however they are elements that provide identity and long-term organizational success. These indicators are included in the BSC according to their relationship with strategy (Cretu et al., 2015), which is a key element in ASG's edge over competitors.

Chapter 3 The Current situation

Before a solution is created, we need to assess how ASG is doing. In this chapter we present some BPMN processes capturing how ASG currently handles customer requests. In literature, these are called AS-IS business process models. The BPMN models are based on knowledge extracted from interviews with the employees, as well as from looking at the processed tickets stored in the Zendesk database, see *Appendix B* for the terminology and explanation of all operators used in the models.

Figure 6 displays the parent process of this system.

A ticket can be received in two ways. The first way is when the customer sends an email to the helpdesk email of ASG. The second option is by calling ASG directly and letting the employees create a ticket for the customer. Once a ticket has been made through email, an expert staff member assigns the ticket to an employee, so that a ticket can be held responsible. If a ticket is made through a call, and is not solved right away, the ticket gets put into the database and is later assigned to an employee. The linking of employees with a ticket is needed because occasionally an employee has to call the customer to discuss details and misconceptions. From that point onwards, they can help the customer, depending on the request, which will each be covered in this section (3.1)

Noticeably, the process of answering tickets is ongoing until there are no answerable tickets left. However it can be interrupted whenever a customer calls. This does not mean the progress of the interrupted ticket is lost. The ticket of the call becomes urgent and thus has conditional priority to be finished, however if the time to solve the ticket takes too long, the customer will be politely informed that they will reply by email within 5 business days and a ticket is treated the same as other tickets in the Zendesk database.

A noticeable bottleneck of the system is that whenever another employee picks up the phone, they lack proper structure to forward the message to the CCC employee. Some employees put the data directly into Zendesk by emailing the CCC, whilst others write it on a post-it note. When linked in Zendesk, it often occurs that they aren't correctly categorized or miss specified information that the experience of a CCC employee would catalogue.

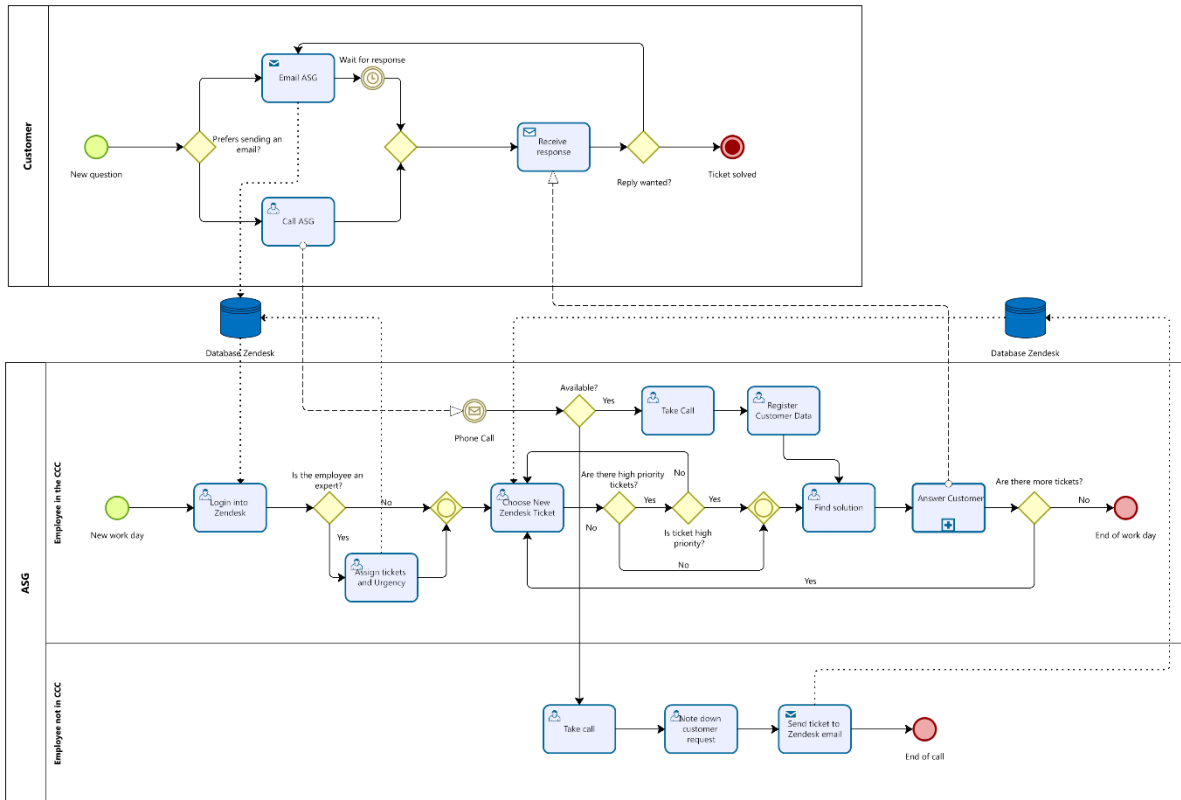


Figure 6: Parent process of the CCC

3.1 Helping the customer

Customers mainly have questions or complaints about two different aspects of ASG service: billing, or meter installation. Meter installation is split into pre- installation, which is before ASG installs their own meters or does the invoices, or post- installation, where ASG deals with the invoices and breakdown of meters. An in-depth look about each of these cases is given below, along with the solution approach that ASG is currently using to deal with these questions and concerns. *Figure 7* displays the current process, given that these processes need to be redivided into smaller sub-processes, because each of these sub-processes use separate databases. These sub-process categories are based on the chronological time a resident is a customer of ASG. The figure also displays a Database called B2B. This storage displays the latest rates of all active meters installed by ASG and lets the employee know whether a customer’s meters need an estimation. The employee tries to get some basic information from the customer first, either by asking or looking through the given information of their email.

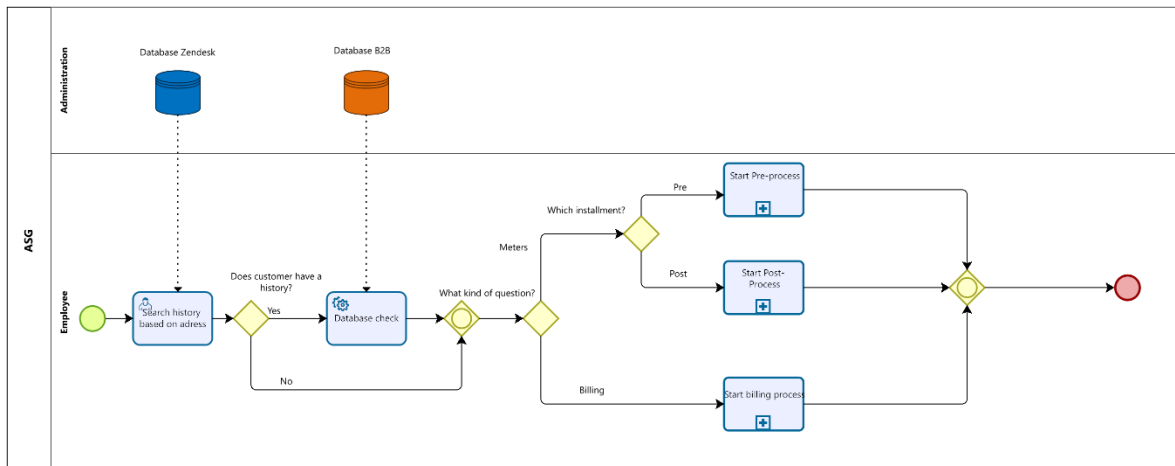


Figure 7: Sub-process Answering the customer

3.1.1 Billing

The billing of customers happens once a year. The invoice end-date of measuring differs per client of ASG, which is convenient because it allows ASG to tackle these customers in groups and not have all of them at once. A bill is an overview of the gas usage for a resident. This often includes the usage of warm water. Customers pay a monthly deposit to prevent a demand for a yearly large sum of money. A bill can state that a customer’s deposit was not enough and demand an extra payment, or it can state that a customer overpaid and receives their extra payment back to their account.

A billing question can be categorized into:

1. Their pre-payment amount,
 - a. Complaint about the deposit
 - b. A request for justification
 - c. A request for changing the deposit
 - d. A request about money
 - i. Receiving money for damages
 - ii. Receiving money for overestimation
2. Questions about the extra payment they have to make that is stated in their annual bill,
 - a. Why the amount they need to pay extra differs from other years
 - i. With comparison and detailed explanation to justify their reasoning
 - ii. Without comparison
 - b. Question to explain how ASG calculates the energy prices
 - c. Question when and how they can expect their bill to arrive in the (e-)mail

Table 1 showcases each of these approaches along with the current solution, whilst Figure 8 displays the BPMN model. The BPMN model simplifies the informing of the customers because they require a simplified manual response from the employee.

Billing issues and requests	Solution Approach
Request to change deposit	Changed when they request to pay more-> Forward requested change to finance department. If request is to pay less, send justification response
Rejection of deposit	Desk research on the meter rates and current trends of energy pricing

Request to pay in instalments	Forward request to Finance Department
Question on difference in annual payments (meter rates request)	Desk research on the meter rates and current trends of energy pricing.
Question on why they need to pay a certain amount of money	If the requester is from a company of which ASG directly deals with the invoices (company X), they need to perform desk research. Else, the employee needs to redirect the customer to the company responsible for the finances of the invoice (company Y).
Question about deposit	Explanation on yearly rates and ensuring you have a buffer, categorized as a non-heavy researchable question
Question on bill arrival	Look at the resident complex and inform the due date of their annual billing, categorized as a non-heavy researchable question
Question as to how ASG calculates their energy prices	Explanation on yearly rates, categorized as a non-heavy researchable question
Question on how the energy prices of ASG are calculated	Explanation on yearly rates, categorized as a non-heavy researchable question

Table 2: Billing issues and Requests with their respective solutions

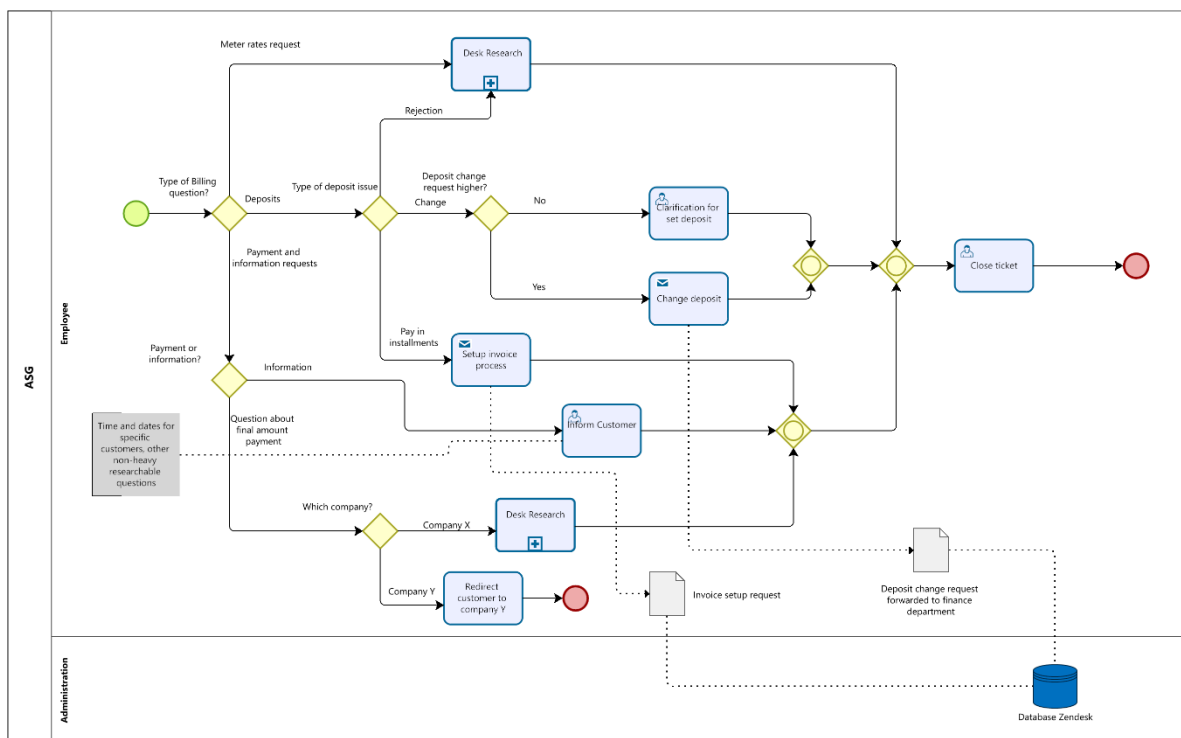


Figure 8: Sub process billing

3.1.2 Meter pre-installation

Before meter installation, the customer is informed by mail and by letter when they will get an appointed time slot to allow a mechanic to enter their building and replace or install new ASG meters. However, whenever a renovation takes place, customers also need to have newly installed meters. Question and requests that can arise:

1. Question about their current timeslot
 - a. Request to change appointment date and time

- b. Request to confirm date and time of meter installation
- c. Expectations around the changing of the meters
- 2. Request to get an appointment for new meters after a renovation or maintenance
- 3. Request to explain why the meters need to be changed and how they work

Table 4 showcases each of these request types along with the current solution. Then Figure 9 shows the BPMN model to handle meter pre-installation requests. Databases are color-coded to keep track of their frequency. The database Trello is used here to communicate and make notes with the employees who need to work in the field to install meters.

Pre-instalment issues and requests	Solution Approach
Request to change their current timeslot	Look at available time slots on the planning database. If there are no available time slots left, inform the customer that their appointment will be planned in the next wave of installation.
Request to get an appointment for new meters or maintenance	When the request is from a customer from Z living corporation, check confirmation invoice, set date in Trello. If not from that corporation, plan appointment in Trello, send invoice details to FD
Request to confirm their current timeslot	Check time slot in planning database
Question as to why the meters need to be changed	Explanation on estimation countermeasures

Table 3: Pre-instalment issues and requests

The creation of a new appointment in Trello is done through a template that employees need to fill in. This template requires the use of multiple databases to get the right information. When having the basic information, the employee is required to look up the status and reset due dates of the meters in the B2B database. This is to confirm the meters run on a similar cycle. Noticeably, the activities of looking through each database takes a substantial amount of time.

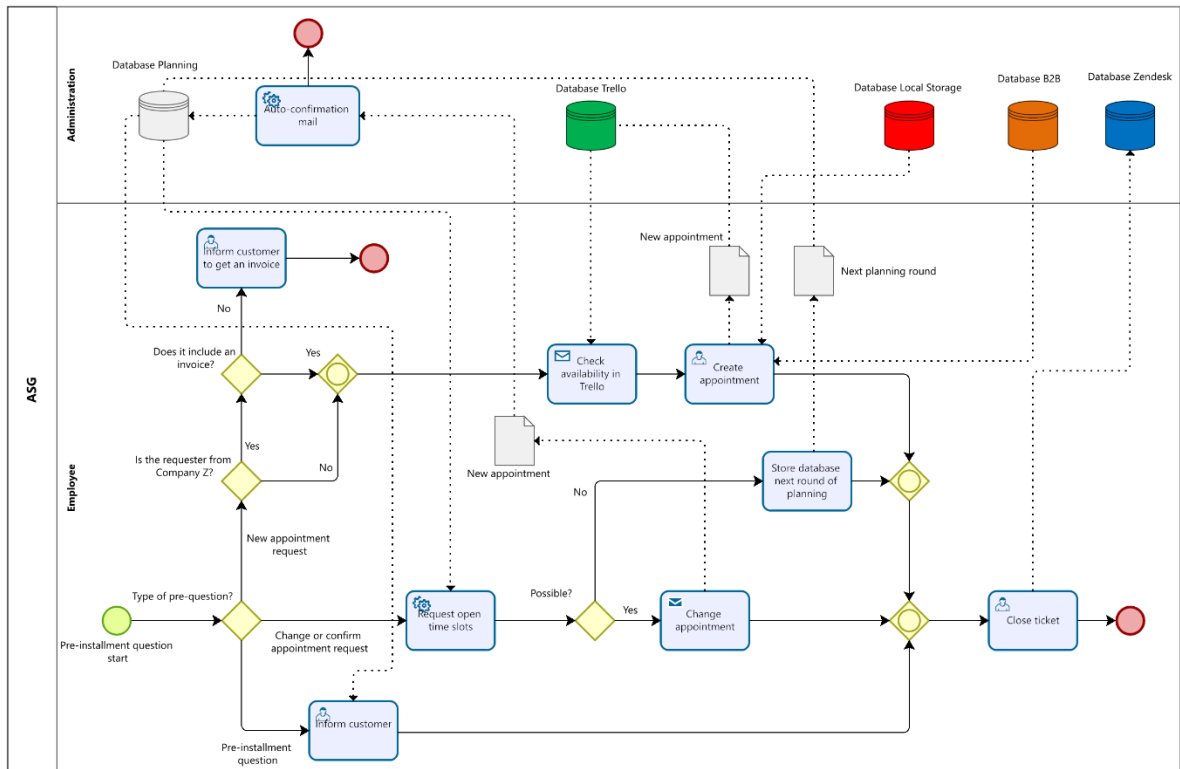


Figure 9: Sub process pre-installment

3.1.3 Meter post instalment

After the installation of water and heater meters, the customer gets access to ElineHome, which is a website created by ASG themselves, where the values of meters are displayed per heater in the house and shows their daily usage. This website also has a backend which can be considered as a database which can show the status of login for the customer. Questions and requests that usually follow:

1. A request to showcase the values of their meters:
 - a. Request to see their own meters for a certain time period
 - b. Request to see the meter rates of the entire building for a custom time period
 - c. Request to compare it to meters of another resident in the building
2. A question about ElineHome
 - a. Request for a login code
 - b. Request to remove a meter from their house after a renovation has taken place
 - i. Complaint about it still being displayed on ElineHome
 - c. Complaint about seeing a difference in own meters and values displayed in the application
 - d. Request to switch the location of meters around in the house to increase accuracy.
3. Notification that they have moved to a different address

Table 5 showcases each of these approaches along with the current solution and Figure 10 displays it as a BPMN model.

Post-installment issues and requests	Solution Approach
Request to showcase own meters	Do desk research

Request to look into general building meters	If the rates of the building are considered public do desk research
Request to see meter rates of others	Explanation on privacy
Request login code for ElineHome	Check stage of login, send login mail to their home
Request a change in ElineHome	Forward to technical department
Notification of moving to a different address	Change billing information and make a backup ticket that it has been notified by the customer

Table 4: post-installment issues and requests

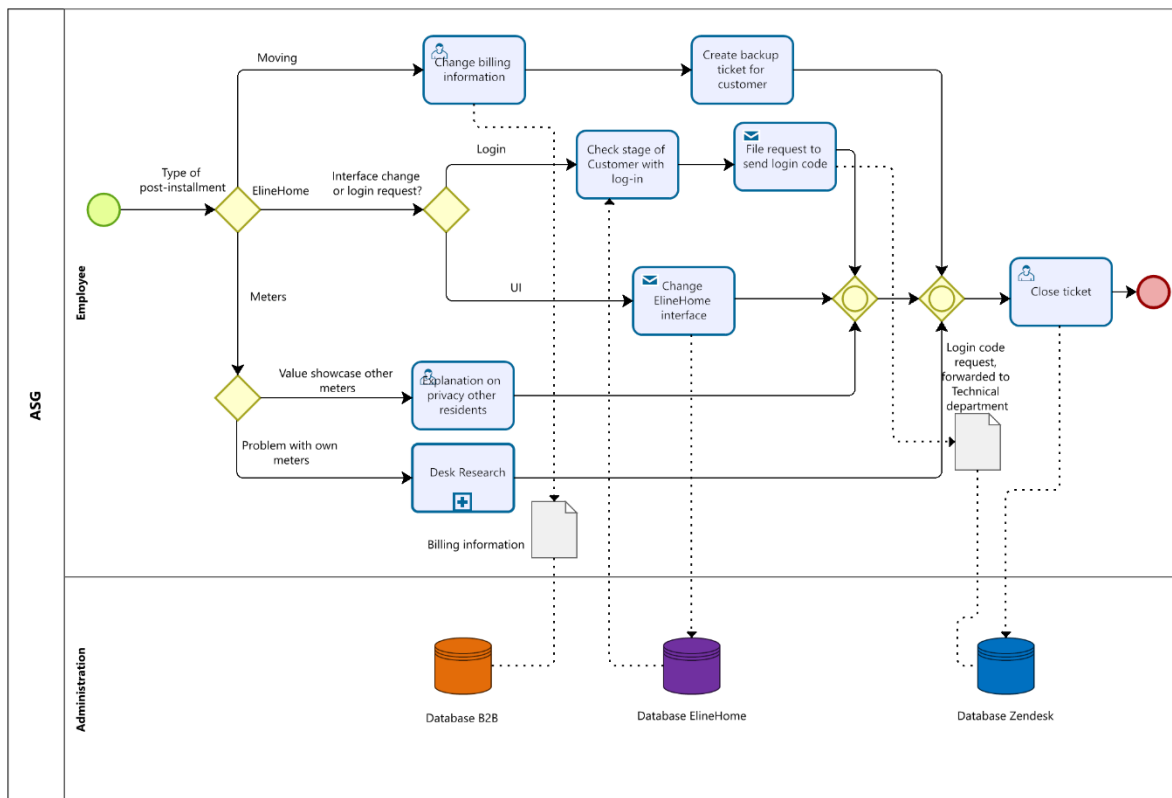


Figure 10: BPMN model of the post-installment questions

3.1.4 Other processes

Managers of living corporations request changes or contact ASG for different things, these need to be handled differently, however are generally not of concern for a normal employee of ASG using Zendesk. Another infrequent request of customers could be relating to damages, an expert is always required to give an accurate answer. These requests will not be modelled, because they immediately call for another department.

3.2 Desk Research

The time it takes to answer a ticket increases when the customer requests to see their billing over the past couple years along with the rates of the meters. As ASG wants to be as transparent as possible, they check for the rates of the meters in their B2B database, as well as checking previous statements that are stored on their local storage database. Noticeably this takes time and accuracy when a customer demands a justification as to why there is an increase. *Figure 11* indicates the steps

an employee needs to take to arrive to the right response. This process is viewed as complex due to the systems the employee has to go through.

For old files in the database, the employee needs to use their address in the B2B server to get a complex ID of the building, which are then stored in either the “knowledge bank” file or “Current transaction processing” file. They often need to compare the data to the customer’s own findings. Sometimes it happens that some files are not correctly or fully processed and thus they require the help of an employee in the company who has the missing knowledge , to which we will refer to as an expert in the figure. Often the files in the knowledge bank are large PDF photocopies of old invoices. Since each of the customer’s request slightly varies, it becomes impossible to model the requested data, therefore the model portrays an analytic approach which gives a manual answer. The methodology to answer the customer is then saved inside the ticket on the Zendesk database, so that it can be re-used in a future case.

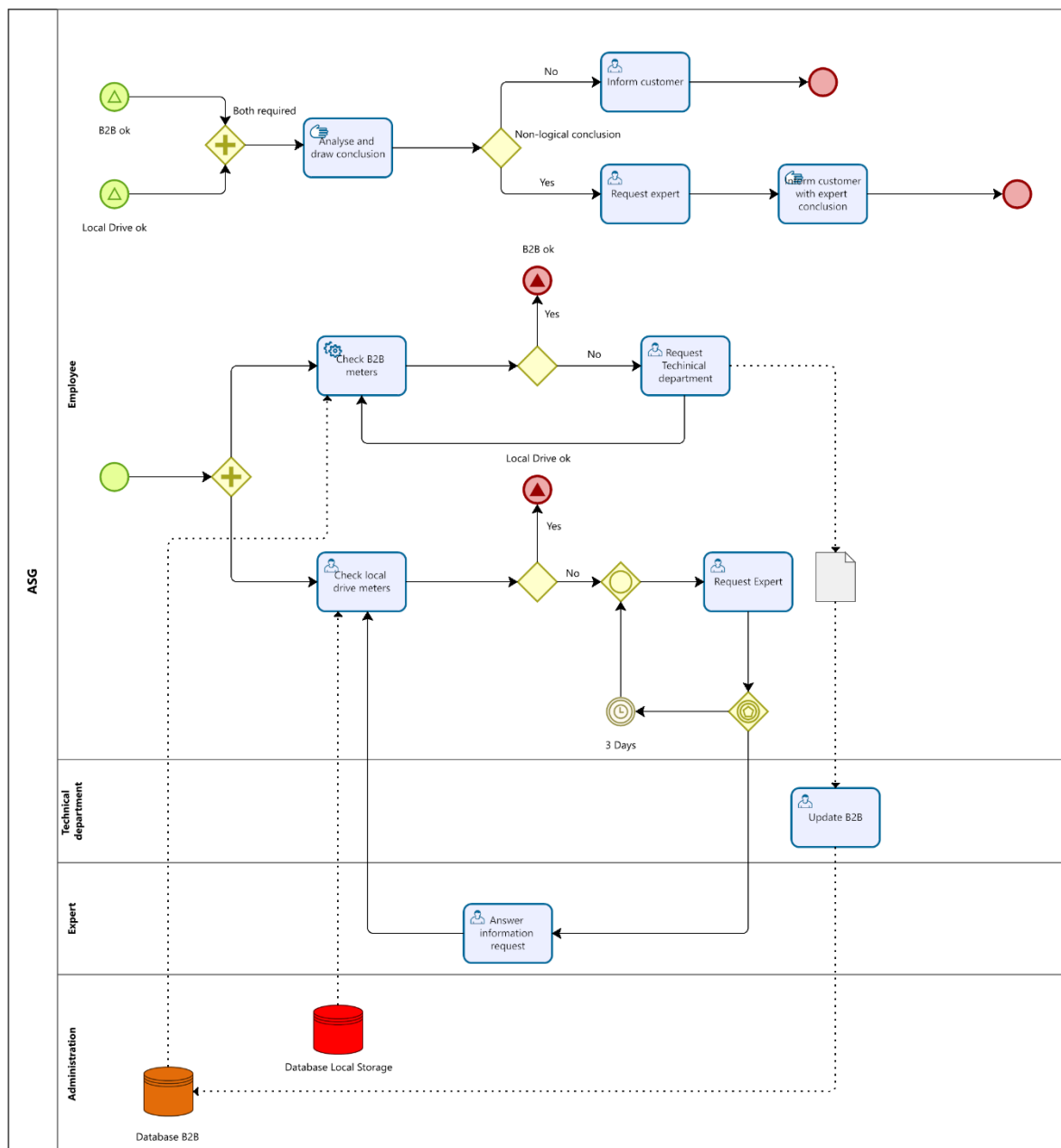


Figure 11: Desk Research BPMN model

3.3 Factors

Now that the AS-IS processes are well-understood, we can focus our attention on the this thesis's first knowledge question:

What factors contribute to the first reply rate?

When a response is confirmed, a reply is sent, and this reply is recorded as a set data point for Zendesk. Responses to customers can be done in three separate ways: 1) by sending a final response; 2) by sending the a response expecting a reply from the customer; or 3) by sending a response that indicates that the ticket is still being processed and needs longer time to help the customer. The last option is currently not protocol and is done only in rare cases. The time it takes to send a response to the customer thus depends on KPIs that have to be created. The main related KPI to the given FRT KPI, is the **administration time per ticket**, which plays a big role in desk research. This can be split into the solving and waiting time:

- Solving time: Time it takes to find the solution to the request of the customer
- Waiting time: Time it takes before getting a response from another department when forwarding a ticket to them.

Additionally, when a new or inexperienced employee is working, a supervisor needs to be present to confirm their responses to tickets. Currently there is a set protocol which specifies that employees need to document all phone calls in form of a ticket, even if that customer has been successfully helped. Yet, employees tend to not follow this protocol strictly, due to no reminders or re-training.

The waiting time can be split into the KPIs time loss per expert/new employee. Since experienced employees know what to do in most cases, they often require less help from another expert and can solve problems on their own.

3.3.1 Measurability processes

The described processes of helping the customer listed above, showcase some bottlenecks relating to the noticeable issues. To identify if the redesign improves this process, the necessity of KPIs is required. Again, this is done by means of the *Balanced Scorecard* methodology. The given assignment wants to improve the efficiency and customer satisfaction, which indicate Customer and Internal process perspectives. The financial aspect can be considered in form of labour needed per employee, as well.

The KPIs are seen as important and thus will be added to each of the processes in *Table 6*. Zendesk allows an option to request customer feedback, however ASG currently does not see the option as a viable alternative to increase customer satisfaction. So, to measure this KPI, the amount of requesting responds from a customer will be counted (i.e., Customer requests meters because they indicate low usage of a meter, despite high measurements. After an employee answers their request, they request a further follow up to explain the high rates.)

The time loss KPIs are included to see the difference in trained and untrained staff, which is important for hiring new employees on a financial aspect.

Key Performance Indicator (KPI)	Value	Process	BSC perspective
First reply time	Time it takes for a customer to get a first response from an employee.	Sub-process helping the customer	Customer

Administration time per ticket	Time it takes for an employee to process the ticket before solving the issue of the ticket.	Desk Research	Internal
Customer feedback	The feedback a customer gives when not being satisfied with the explanation given in the first ticket, quantified in positive/negative	Sub-process helping the customer, Parent process	Customer
Employee feedback	The feedback an employee gives towards the changes made in Zendesk, quantified in positive/negative	Over all employee processes	Growth and Learning
Time loss by expert	Time that can be optimized for an experienced employee at the company	Sub process helping the customer	Financial
Time loss by newcomer	Time that can be optimized for a newcomer at the company	All models	Financial

Table 5: Combination of selected KPI linked to process and perspective

3.4 Current use of Zendesk

Appendix D showcases a full overview of the interface of Zendesk. Currently, the communication of the employees that use Zendesk is efficient however the knowledge and tools that the application has are not fully explored. Although the priority status of tickets is used seldomly, on the occasion it does happen.

Important is that during the analysis of this process, ASG has decided that starting from March of this year to have bi-weekly meetings with the employees of the CCC as to highlight important and long untouched tickets.

3.4.1 Noticeable issues

In Zendesk itself, tickets can be linked together when an employee combines the ticket, they do this whenever they notice that it refers to the same address as a previous ticket. This is often useful to quickly get more background information or see if an earlier proposed solution was successful. (this is useful when trying to get the history in the first step of the answer customer sub-process, Figure 7). Consequently, when tickets are not linked to a situation, because the employee sees that it already has been linked multiple times, which happens in the parent process when non-CCC

employees submit emails instead of tickets (*Figure 6*). Those tickets will become lost unless the employee takes the extra step of manually checking the address again with the Zendesk database.

Another issue is that in the *Parent process*, customers sometimes do not get an answer regarding the status of their tickets within three to five working days, even though a lot of internal discussion is included in the ticket.

A third issue is the lack of automated replies in all *sub-processes*, in form of macros. Since ASG wants to come across as a personal company, they prefer their employees to come up with a preferred response. This adds extra time for the expert staff to check the accuracy and professionalism of the response from the employee before replying to the ticket.

Chapter 4 Solution Design

This chapter proposes an optimal solution to the main research question and tries to support the following sub-questions:

How to best implement the selected method into ASG, taking the organization's characteristics and limitations into account?

How does the implementation of the proposed method affect the FTR?

4.1 Strategy

Figure 12 displays the steps required for designing ASG solution. As can be noted, the process analysis step has partly been done in the previous chapter. This chapter will also look at the requested changes for employees.

Since the current process is described as well as the highlighting of the bottlenecks, the current goal is to optimize and redesign it. This needs to be in line with the goals of the company: Quicker and more complete customer interaction. Even though the goal of ASG is to have the highest optimization, a lot of processes in the models are still done by the Zendesk employee.



Figure 12: Solution Design Strategy according to White and Miers (2008)

The designed solution needs to ensure that the workload for those employees becomes less so they can process more tickets easily. A key design chance of BPR is to include more optimization in form of creating more ICT-processes, which is in line with the current strategy of ASG.

Furthermore, this chapter will discuss the needed changes requested by employees, the possible changes that can be made in Zendesk, new model design, and an implementation plan of the designed changes.

4.2 Employee required changes

To ensure that the changes involved are relevant, the CCC employees were interviewed and watched in the way they worked to encounter problems and list their preferred changes. The most preferred changes were:

- Redesign of the current protocols for non CCC employees for them to structurally forward problems to them or Zendesk
- Having better resources in their local database to not request an expert, because the superintendents are not always working when encountering a specific problem.
- Request to have quicker access to the backend of the ElineHome database for information on a customer to establish their problems with logging in earlier.
- Ability to fully see the last comment of Zendesk or have a summary before opening the ticket.
- Better automation for tickets that get unanswered by employees
- Having access to specific data that can be analyzed to highlight oversights and errors during the installation process
- Specified data that showcases areas where complaints about energy usage is high so that ASG has analytical research for the building owners. Which can lead to them being asked to work for the customers.
- The need to have one designated employee to work full-time for the company so that the knowledge and experience of that employee can be requested by others at any moment, as currently all employees that work at the CCC are part time.

4.3 Implementation improvement choice

In this subsection, we present the proposed redesigned business processes, aiming at improving the current ones explained in chapter 3. The redesigned business processes are known in the literature as TO-BE business processes.

Since ASG is always developing their front and backend of operations, they continuously give developers the assignment to create new systems and databases. It is recommended that, they will program a tool to assist the creation of the newly designed and improved models, to aid the improvement of the CCC

The best way to implement the changes of the new methods is by automation. The optimal solution to improve the efficiency of the employees is to cutdown their research time to answer tickets. Primarily this is necessary in the desk research process as well as the appointment creation through Trello. The bottleneck that can be improved in those processes is the database search. So, the created tool will ensure that more information is directly available to the employee. Furthermore, we will go over each process and see what will be improved.

4.3.1 Parent process improvement

The use of a proper guideline for employees on how to register a call and forward it to the CCC can cause for better stability and consistency for the CCC employees. This would save the look up time by at least 2 minutes for inexperienced employees and 1 minute for experienced employees when only receiving an address of the customer. Additionally, if a non-CCC employee forgets to note down the address, it saves calling back the customer whenever they need to go just off a phone number.

Another factor that will optimize the process in form of automation is the use of triggers, these triggers will activate whenever a ticket enters the Zendesk system and identifies tags and words in the title to determine to whom the ticket needs to be assigned. This will primarily save time for the expert of the CCC.

Also, the system will continuously check tickets and notify the employees whenever a ticket needs an urgent reply based on the amount of time the ticket is open.

The redesigned process can be viewed in *Figure 13*, the template for Zendesk and the new triggers installed can be found in *Appendix E*.

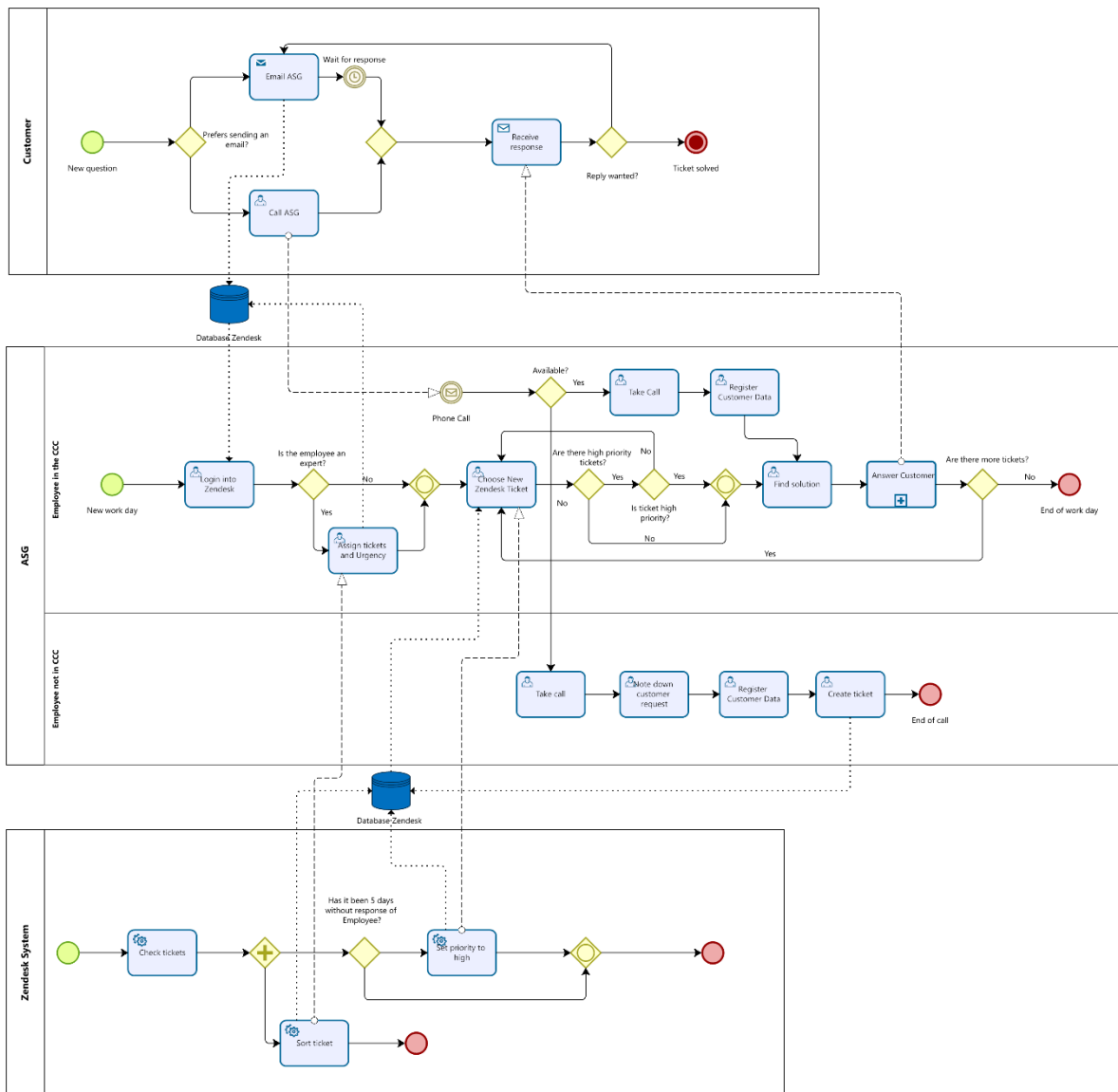


Figure 13: Improved parent process

4.3.2 Answering customer and billing process improvement

The small sub-process of answering the customer is now improved by implementing a new search database designed to work on any information a customer has and combines it into a simple overview. The searching of a customer will also be made easier by allowing the database to be backed by a search algorithm which can auto-fill addresses names and house numbers, as well as show the closest matches when typing in an address or name incorrectly. *Appendix E* showcases an overview of the current development of this tool.

As of the current state, the billing process itself does not need a systematic change, however the sub-process Desk research does have some flaws which will be discussed in 4.3.5. To prevent unnecessary calls, ASG should inform customers on their invoice, which companies to call in case they have questions, along their respective contact number. ASG can only justify the values of the meters here, and not the costs. So currently, when having a request for price justification, the ASG employee needs to do a desk research to find out which company is responsible for that, redirecting the user to the given company. And as aforementioned, desk research may take a long time.

Figure 14 shows this new process. As can be noted, there is only a minor change in the beginning of the process. Since the new database automatically shows all the customer information to the employee, the employee does not need to check if the customer has history and search the customer history herself as in the model of *Figure 7*

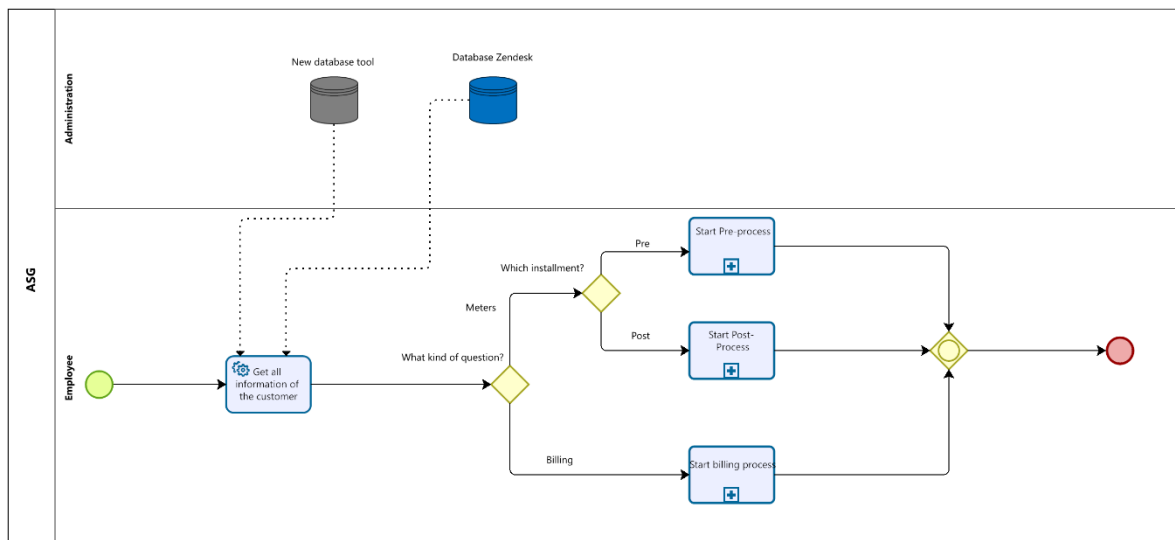


Figure 14: Redesign of the answering customer sub process

4.3.3 Meter pre-installation improvement

The goal of this process is to ensure smooth communication with the customers regarding the conformation and change of their appointment, as well as helping a customer quickly with small informative questions.

The current process to plan an appointment through the planning app works effectively and efficiently, thus it does not need to be altered. The steps on the side of the employee will be made easier to get information to set-up a new appointment with the customer through Trello, here it is easy to replace the data requests from multiple databases into one from the new database tool. Additionally, this will speed up the time to answer a customer on the phone for small questions.

Figure 15 showcases this new process. The flow of activities is not changed however the new database allows the *inform customer* activity and *Create appointment* activity to be done faster.

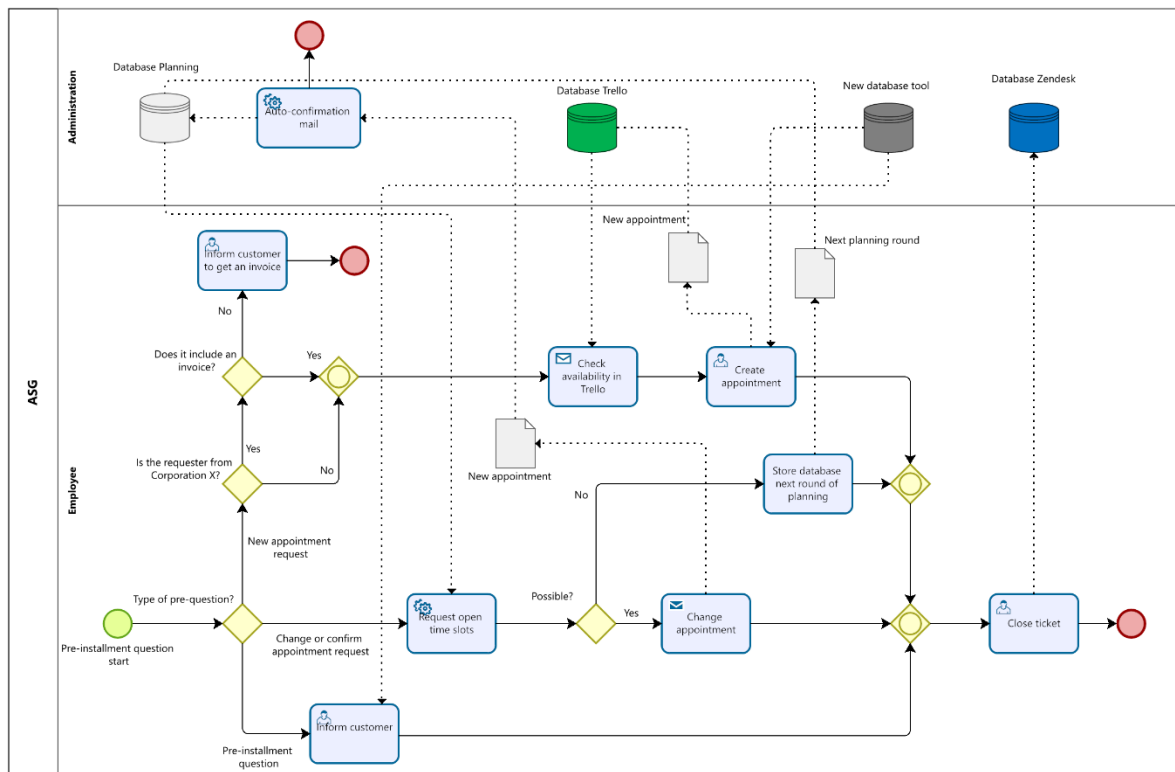


Figure 15: Pre-installment process redesign

5.3.4 Meter post-installation improvement

While the system to help customers does not change, the new database tool allows the removal of one less database to be used by the employee. This additionally decreases the time to allow a customer to be helped on the phone and thus having to reply less.

Figure 16 showcases a redesign of this process

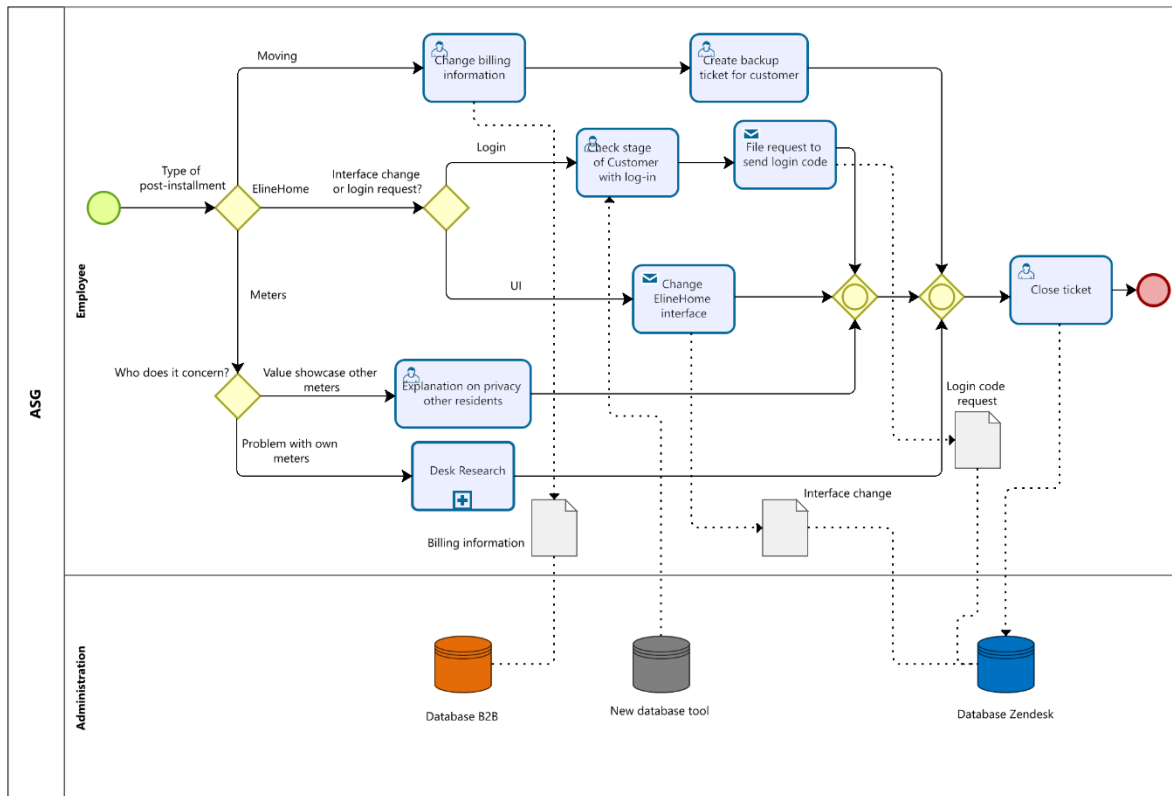


Figure 16: Post instalment process redesign

4.3.5 Desk Research improvement

The crucial change with Desk research does not look significant however it allows the employee to instantly get an overview of the customer, without having to dig through the two databases as portrayed in Figure 11. With the instant overview, it would immediately highlight missing information and thus the contacting time for an expert is shorter. Also, since there is an automated urgency timer placed in the parent process, employees are quicker to request the help of a superintendent whenever the data is inaccessible.

Figure 17 displays the new designed process.

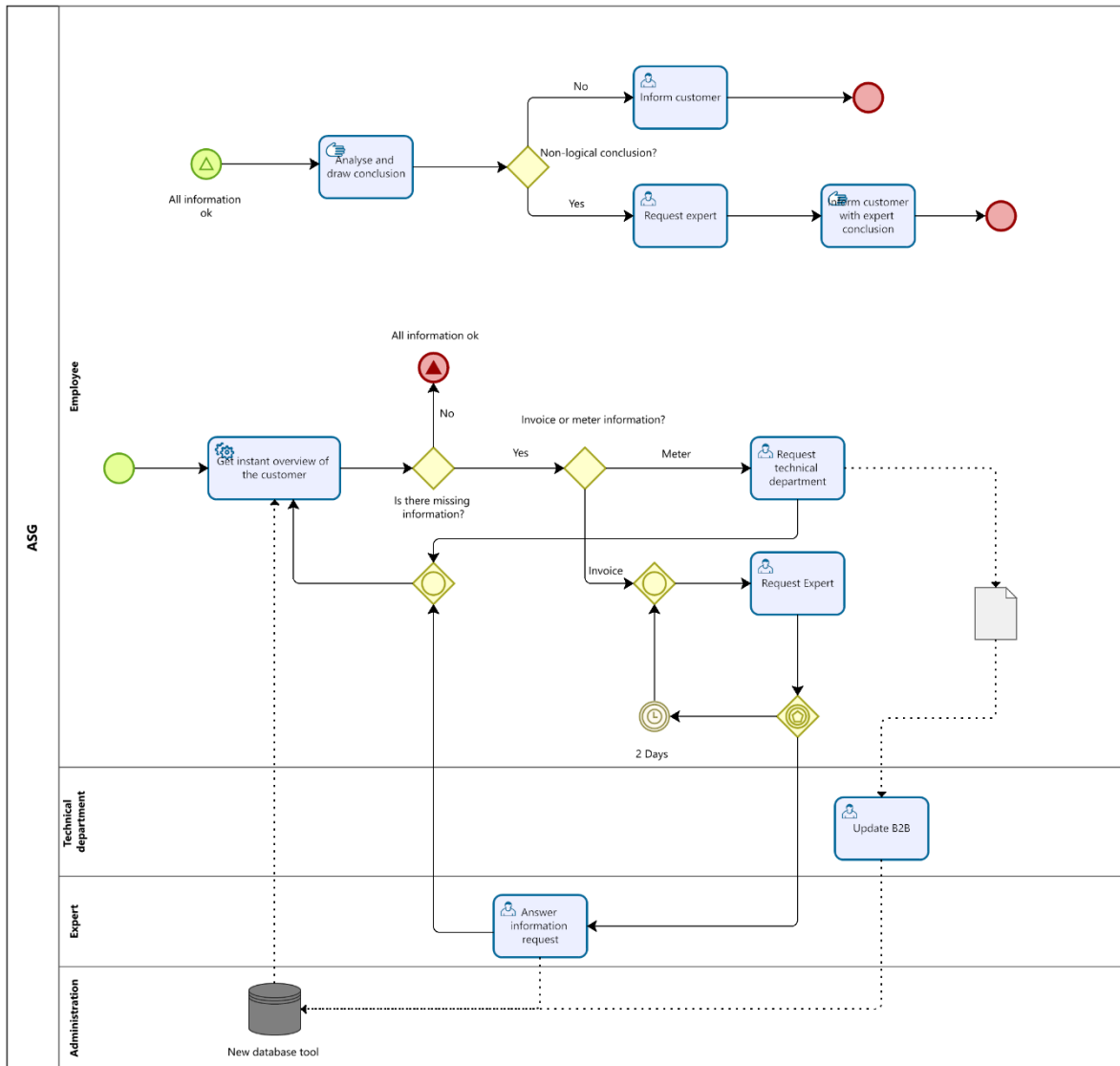


Figure 17: Desk research redesign

4.4 Zendesk UI changes

The Zendesk application allows for multiple options of customization. The current situation of Zendesk (see *Appendix D*) allows employees to navigate to tickets and groups easily. The structure of Zendesk allows task division for the employees that work at home or part time. Employees always have the option to take a ticket from another employee whenever they think the time limit to respond to a ticket exceeds five days.

4.4.1 Zendesk Play

The application has the option to use the 'Play' button, which is a feature Zendesk offers to improve the efficiency of the employees by skipping the time of the employee selecting a ticket by themselves, since employees tend to read part of the latest development of a ticket first (see *appendix C*, for the use of comments) and then decide to work on the selected ticket.

4.4.2 Trello integration

Currently, ASG is not making use of the right sidebar of Zendesk. This sidebar allows the integration with other applications. One of those applications is Trello, which includes an easier process of making appointment tickets. The integration allows Zendesk to scan the ticket and fill in part of a

template. This template will not be seen by customers and is intended just for the internal employees, thus optimization.

After a meeting with the higher-ups, the integration with Trello is not deemed an essential improvement since the new implemented database allows the employee to copy the necessary information for a ticket without the need to look into other sources.

4.4.3 Zendesk explore

When Zendesk is upgraded to the next subscription level, certain functionalities become available which allow for the following additions to the dashboards. Primarily the Explore workspace is opened to admins which allows the implementation of automatic reply- bots, guides and report queries. Even though an automatic reply-bot could make automated messages whenever a ticket reaches the five working days reply goal of ASG, it does not fit in with the characteristics of the organization, due to the impersonal response. On the other hand, the remaining Explore additions can be of interest for ASG.

The new explore function opens manual and built-in queries that create specific dashboards. From these dashboards, ASG can detect whether a certain area, location or building complex has a solvable issue where they can prevent future tickets. Additionally, they can approach the building owners and living corporations with their data and explain that the customers could get informed better. This increases the satisfaction of the clients, which leads to positive recommendations from other companies. Lastly, ASG can suggest the clients that do not have their meters installed to be hired by them, which generates income for the company.

The current way forward with Zendesk is to optimize automations and triggers for the employees to work with. After a held meeting with the higher-ups of the company, ASG has decided not to upgrade to the next level to receive more automated data from the Zendesk interface.

Chapter 5 Validation of the Proposed Solution

This chapter will analyse the different KPIs in the current perspective and the future perspective, according to the *Balanced Scorecard* methodology. Through looking at the values of the KPIs, it is determined whether the change of a process will be seen as progress and useful. The discussed results were obtained by interviewing the superintendent, and employees of the client contact centre.

5.1 Financial perspective

The new processes should primarily help speed up the time it takes for newer employees to understand where to get the right information. Currently ASG has no full-time workers that work for the CCC. The team consists of one supervisor, three experienced part-time workers, and during the period of this thesis, two flex workers. Through watching and documenting the time it takes to solve tickets, the time lost for newer employees is higher than that of experienced employees, due to the waiting confirmation by the supervisor or experienced employees. This problem occasionally occurred when no supervisor or expert employee was working. Thus, the time loss would take an additional day to solve a ticket. With the bi-weekly CCC meetings, harder ticket issues were brought forward and were given a general solving approach. This procedure was made for 6 ticket types. With the new changes this would save a time-loss of 2 minutes per ticket for experienced employees in checking the work of the newer employees and 1 full day for newer employees to continue after getting stuck on a specific ticket, this is because on Wednesday and the second half of Friday the supervisor is not working.

Table 7 shows the difference between the previous and predicted time it takes to solve future tickets in the same category.

Ticket type	Time loss new employee	Time loss experienced employee	Time loss new employee future	Time loss experienced employee future
Invoice Overview	1 day	2 minutes	2 minutes	2 minutes
Checking accuracy meters	1 day	2 minutes	2 minutes	2 minutes

Table 6: Time loss now and future

5.2 Customer perspective

The first reply time itself varied on how quick the internal response is per ticket. The new database is not ready yet to be implemented however the new protocols for employees is implemented since July, the bi-weekly CCC meetings to deal with more urgent tickets has been implemented since April. The first recorded time when working at ASG was between 105 and 120 hours and the current statistic taken over a monthly period is 124,4. On first hand this is not an improvement, this is due to the inconsistent method that Zendesk uses to calculate this statistic. A big factor here that was not being documented accurately the availability of the employees, which would get assigned tickets regardless if they were on holidays or not. Also ticket groups that dealt with the billing of customers were pushed to a later date of completion, since those ticket types can all be put on a monthly reply schedule. This meant that the first actual reply was recorded on a later date. To see if the process changes have a positive effect, it is recommended to take let ASG measure their performance changes on the same ticket frequency over the coming months. The type of ticket which ASG mostly had answer frequently changed during the working period at ASG, and each question type differs significantly. Table 8 displays this difference.

Month 2022	FRT	Most frequent ticket type
February	106,80 hours	Billing
March	110,06 hours	Post-instalment meters
April	101,15 hours	Pre-instalment meters
May	108,18 hours	Billing
June	121,07 hours	Desk-research
July- till the 11 th	124,4 hours	Pre-instalment meters

Table 7: FRT rates per month

It is predicted that the frequency of tickets will increase as ASG grows. However, the processes for each ticket time is expected to be less due to the addition of the priority automation. This would put the focus of other employees on a ticket whenever the assigned ticket is becoming urgent for an employee that is not working that day.

The number of tickets that received additional responses to determine the customer satisfaction did not fluctuate during the recorded time-period of the thesis, the main reason for this was because the additional responses from customers were related to issues that ASG could not solve since the problem was outside their operating zone.

To conclude, the changed processes in the system of the parent process (ticket creation by non-CCC employees) do not show a significant improvement yet, but needs to be monitored over the coming months.

5.3 Internal perspective

The future situation of the internal perspective is focused on the administration time per ticket, which primarily takes a long time in desk research. The newly designed system should not change the approach a desk research ticket is dealt with, because each ticket can have a differently drawn conclusion which might lead to changes in the technical or billing department. The process change that is relevant here is the implementation of the new database, and the system automation that notifies employees that a ticket is becoming urgent. Since these automations were not yet implemented, the future KPIs here are predicted values rather than measured ones.

The search for data in the current state takes 5 minutes for easy to find tickets and 10 minutes for harder to find tickets with confirmation. The projected time with the new database is 3 minutes for both hard to find and easy to find tickets. This is a time save of 2 minutes for easy to find tickets and 7 for harder to find tickets. On a yearly basis the number of incoming tickets is 2376*, of which 455** tickets are simple appointment requests and for 80%*** of the remaining 1921 tickets desk research is required, so this change would save 51.3 hours and 179.3 hours per year for easy and hard tickets respectively.

*=Solved tickets were counted using the incoming tickets tracking of Zendesk.

** = Simple appointment tickets were counted using the search function over a counted year with Zendesk.

***= This value results from the opinion of an expert employee.

Table 9 gives an overview of the current and future changes.

KPI	Current situation	Future Situation
Administration time information search	5-10 minutes	3 minutes
Average time per year easy ticket (5)	128.1 Hours	76.8 Hours

Average time per year hard ticket (10)	256.1 Hours	76.8 Hours
Warning system	Manually done	Automated per 120 hours

Table 8: Changes internal perspective

5.4 Growth perspective

The feedback of employees that work at the CCC is done through questioning the experienced and newer employees on how the new process changes would affect their workflow

5.4.1 Employee future possibilities

The superintendent for the CCC foresees that the new database can be used with another program. This database would then be connected to the backend of ElineHome. So, when the entire tool is functional, a customer can be helped immediately while on the phone with any question that does not require an analysis from desk research. Desk research itself would save even more time which allows for an even quicker first response time.

The superintendent also sees that with more triggers and automations, the administration work of sorting through the system will be kept to a minimum. The future possibility here would be no administration work unless manually requested by employees.

5.4.2 Employee concerns

The employees showed some concern towards the transition to a new database, primarily the following is said about the new database:

-
- Since they are well adapted to the use of the current system, switching to the new system might take more time than to keep the status quo, since it is yet another database that they need to learn
-
- When the database has an error, future employees might overlook the problem and do less research on their own to double-check.
-
- They are afraid to become overly dependent on the use of the new database and as a result, require to be re-trained to deal with data that is not implemented into the database.
-

Primarily the following is said about the new triggers and automations:

-
- The triggers do not cover all situations and need to be improved over time.
-
- The triggers need to be able to detect different words with the same meaning.
-
- The new automations could cause for a stressful environment whenever a lot of tickets suddenly switch to high over a holiday or weekend, the need for exceptions must be implemented. So Zendesk should not assign tickets to employees that are on holiday.
-

Chapter 6 Conclusion and Recommendations

In this chapter, we address the following knowledge question: *'What conclusions and recommendations can be made after conducting the thesis at ASG?'*

6.1 Implemented Recommendations

The main recommendations implemented as a result of this thesis can be summarized as follows:

- The process of looking into multiple databases needs to be improved using one new database to combine the information. Using a new database would develop a more efficient strategy to deal with longer tickets and eventually save time for employees so that ASG does not need to hire more part time workers.
- The creation of tickets should be structurally submitted by non-CCC employees. By having them take calls, they can easily create a ticket so that the employees of the CCC do not have to create a ticket themselves by reading it off a note.
- By using triggers, the sorting time for expert employees will shorten, opening the possibility for these experts to focus on difficult tickets faster. The automations will redirect the focus of tickets being stuck at a newer or experienced employee. This will help ASG increase their response time by giving the customer a timely explanation or speed up the urgency to finish the ticket in the same day.

From evaluation with the researched employees, we deduce that the projected and already introduced changes are seen a welcoming and pleasant. These optimized processes will eventually show a significant improvement throughout the administration, occupancy rate, especially for the newer employees, and IT processes of the company.

6.2 Additional Recommendations

Aside from the concluded current implementations the company should consider the following recommendations to be implemented for the CCC:

- On their website, they should have a separate tab that allows a customer to fill in some more details regarding the owner of the building (living corporation) and issue that they encountered; these can then be pre-filled as tags when combined triggers in the Zendesk software. This would save ASG from buying the expanded package that Zendesk offers where they automatically offer this feature.
- The employees of the CCC should also learn to change simple deposit increases per request of the customer, instead of continuously forwarding them to another department, saving lingering time of the email and thus giving a faster reply rate.
- From observing the employees, this thesis recommends that one employee is available for at least four out of five days at the company, to represent the department head of the CCC and to prevent the tickets of part-time employees to stack up. Currently, the HR manager is treating the CCC as part time management function. The interviewed employees recommended two full time workers, however over time, the knowledge and experience can be better documented and thus the need will lessen.
- The growth of customers will inevitably lead to more tickets and customers calling the CCC. Currently, there is no need for multiple dedicated CCC employees to be on. However when this changes, ASG needs to include an option menu for customers to be filtered better to the right employee. This will also allow them to inform customers with set messages that increases the chance of customers not having to be connected through. This will reduce the traffic and waiting times for other customers.

6.3 Validity and reliability

This thesis has followed the basis of validity and reliability according to *Schindler and Cooper (2009)*. Reliability refers to the repeatability of what needs to be measured when conducting a design for an experiment, to get consistent results. Here we used the two given perspectives: stability equivalence and internal consistency. Since the research is done over a 10-week period was possible to have balanced intervals between measurements. We also included a limited number of measurement questions for the staff to answer during interviews to still get quantifiable results.

With validity, we must consider the design of this experiment. To ensure data is gathered consistently, we used the established and appropriate methods. Furthermore, the conditions related to variables were standardized, to reduce variation between the results.

6.3.1 Interview validity

The designed research asked feedback from the employees in form of an interview. The feedback they gave is relevant for the data results because the system needs to be comfortable to their needs. The interviews were done in a qualitative method. However, to limit their frame of orientation, the question were primarily focused on small time management guesses and a closed yes or no answer, where if wanted a further explanation was allowed (Philipps & Mrowczynski, 2021). The reason for this is reflected in section 1.3.3.

Lastly to ensure that we had minimal issues in the external validity ,which questions whether the observed causal relationship can be generalized across persons, settings and times (Blumberg & Cooper, 2014), we shall specifically apply the proposed method to ASG, where mainly the BPM model was altered or adjusted to be applied to a more generalized situation, when needed.

6.4 Restrictions and future research

This part discusses the restrictions in the research, followed by the focus on which future research can focus on.

Because this research is conducted in a short timeframe, the research is limited in testing and data gathering. This is due to the time it took to analyse the processes and design a proper solution. With more time, the research could set more concrete data on the changes, as well as look into specific processes for the company.

Also, since the research was held in a specific period where ASG does at least two billing invoice rounds (letters send to customers about payment). Thus, most of the incoming tickets were focused on payments and energy usage. The research would prove more inclusive if it was done over a larger period of time to account for different seasons that ASG has. Lastly, during the second half of this research, the company had a lot of employees going on their holidays, which limits their capability to test the new changes and thus the sample size and employee feedback became smaller.

Lastly, the idea of comparing with other companies was rejected during this research, since ASG is trying to be an entrepreneur in their own niche. Looking at other tools similar to Zendesk was also disregarded, since the time to switch to a different service would not be feasible in the time of the thesis. Moreover, searching for another service and convincing the management to switch would be another thesis on its own.

6.4.1 Future research

We envision the following opportunities for future research:

- Zendesk allows for integration with multiple other applications aside from Trello. ASG is currently conducting research on using the project planning software *Monday.com*. If proven successful, the integration would lead to better cooperation between planning appointments and thus could lead to not using Trello anymore. The future is to use the automations of *Monday.com* for creating triggers when using Zendesk for getting new customers. This would create better bridging between departments in the company.
- Zendesk allows the user the request all data in form of a CSV document, which takes a day to generate and gets send to the requesters email. This data highlights ticket tags, with this addition a new tag can support the creation of a dashboard which allows ASG to circumvent the extra paywall Zendesk has set and create their own dashboard. However, studying the feasibility and coming up with a new dashboard design is another thesis on its own.

Bibliography

- Amrit, C. (2014). Business Performance Management [pptx presentation]
- Blumberg, B., & Cooper, D. (2014). Business Research Methods (4th edition). McGraw-Hill Education.
- Burlton, R. (2010), "Delivering business strategy through process management", in vom Brocke, J. and Rosemann, M. (Eds), Handbook on Business Process Management 2, Springer, Berlin and Heidelberg, pp. 5-37.
- Cretu, C., Gheonea, V., & Ivan, A. (2015). *Balanced Scorecard – Strategic Management Tool of Performance in Public Institutions*. 11(1), 12.
- Code of Ethics | National Society of Professional Engineers. (n.d.). National Society of Professional Engineers. Retrieved April 18, 2022, from <https://www.nspe.org/resources/ethics/code-ethics#:~:text=Engineers%20shall%20be%20guided%20in,project%20will%20not%20be%20successfu>
- Falkowitz, R., (2016, February 14). BPMN & service management. This View of Service Management... <https://www.3cs.ch/bpmn-notation-for-service-management/>
- Fundin, A. P., & Bergman, B. L. S. (2003). Exploring the customer feedback process. *Measuring Business Excellence*, 7(2), 55–65. <https://doi.org/10.1108/13683040310477995>
- Heerkens, H., van Winden, A., & van Winden, A. (2021). Solving Managerial Problems Systematically. Taylor & Francis
- Ibo van de Poel & Lambèr Royakkers. (2011). Ethics, Technology, and Engineering: An Introduction. Wiley-Blackwell. <http://ezproxy2.utwente.nl/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=510116&site=ehost-live>
- Kazemzadeh, Y., Milton, S. K., & Johnson, L. W. (2015). A Conceptual Comparison of Service Blueprinting and Business Process Modeling Notation (BPMN). *Asian Social Science*, 11(12), p307. <https://doi.org/10.5539/ass.v11n12p307>
- Lau, H., Nakandala, D., Samaranyake, P., & Shum, P. K. (2016). BPM for supporting customer relationship and profit decision. *Business Process Management Journal*, 22(1), 231–255. <https://doi.org/10.1108/BPMJ-04-2015-0039>
- NWO | Netherlands Code of Conduct for Research Integrity. (n.d.). NWO. Retrieved April 18, 2022, from <https://www.nwo.nl/en/netherlands-code-conduct-research-integrity>
- Object Management Group, Inc. (OMG). (2011). Business Process Model and Notation (BPMN), Version 2.0. 538.
- Ould, Martyn A. (n.d.). Business Process Management—A Rigorous Approach-Chapter 6.
- Philipps, A., & Mrowczynski, R. (2021). Getting more out of interviews. Understanding interviewees' accounts in relation to their frames of orientation. *Qualitative Research*, 21(1), 59–75. <https://doi.org/10.1177/1468794119867548>
- The PMI Code of Ethics and Professional Conduct. (2011). PMP® Certification All-in-One for Dummies®, 671–689. <https://doi.org/10.1002/9781118257579.ch28>
- Theis, L., (n.d.). How to Use Wireframes to Create a Service Blueprint | Wireframing Academy | Balsamiq. Retrieved June 8, 2022, from <https://balsamiq.com/learn/articles/wireframing-service-blueprints/>
- Uitdager energiebeheer sinds 2014 | ASG Nederland. (n.d.). Retrieved April 18, 2022, from <https://asgnederland.nl/>

Venkatraman, S., & Venkatraman, R. (2019). Process Innovation and Improvement Using Business Object-Oriented Process Modelling (BOOPM) Framework. *Applied System Innovation*, 2(3), 23.
<https://doi.org/10.3390/asi2030023>

Appendix

Appendix A: Systematic literature review

A.1 Knowledge question

The knowledge question taken for literature research in chapter 1:

What BPM methods and theories can improve employees' efficiency while using Zendesk?

To get more knowledge on the second stage of the research approach, we need to know what kind of solutions could be implemented for the tool Zendesk, since Business process managing is used in this thesis, we need to identify the methods and theories that could be used. It is important to find similar scenarios and articles that describe the processes of BPM and a management tool.

A.2 Search Matrix

When searching for Zendesk in combination with BPM related queries, the results were 0. When searching without the mentioning of Zendesk the results were 100,000+, so to narrow down the search related terms it is important to have key concepts, the following concepts are considered for the search matrix

Concepts	Related Terms
Business process management	BPM, Business process modelling, Business process model and notation. BPMN
Zendesk	Administration tool, Administration software, Customer service software, service software, Customer service
Improvement	Structure, improving, optimizing

Table 9: Search table

With these constructs we can create a detailed search string that can be put into a scientific article database.

The following string was created when first searching the databases Scopus and the Web of Science:

("Business process management" OR "BPM" OR "BPMN" OR "Business process model and notation") AND (structur OR improv* OR optimi*) AND ("Administration Tool" OR "Administration software" OR "Customer service software" OR "Service software" OR "Customer service")*

To improve on finding more suitable articles the use of the technique "*" was used. This looks for all possible endings for the word put in front of it.

A.2.1 Inclusion and Exclusion criteria

Inclusion and exclusion criteria set the boundaries for what needs to be done in a systematic literature review. The main criteria that will be applied to the given knowledge question will be the date, location of the study in combination with the language used, the number of participants, the design of the study and the type of publication. The goal of these criteria is to narrow down the number of results and make the selected articles relevant to the research question. The university administers the strictness of wanting all articles to be scientifically relevant, which comes with the addition of the articles needing to be peer reviewed. As for the other criteria, a table has been made specifying the content of each.

Criteria Type	Specification	Reasoning
EXCLUSION CRITERIA	Until 10 years ago- Date of publication.	The articles need to use service software that need to have been developed over the past 10 years to be relevant.
EXCLUSION CRITERIA	Articles with unavailable literature are left out.	If the literature was behind a paywall or an uncooperative author, it was left out.
INCLUSION CRITERIA	Europe, United States, Japan, Australia, Canada, New Zealand, Singapore	Articles aim to be relevant in the western cultured social capitalism countries.
INCLUSION CRITERIA	For Scopus, subject areas such as "Computer Science", "Business management and accounting", "Engineering", "Decision sciences" "Social sciences", "Mathematics" "Economics econometrics and finance" and "Psychology" have been included.	These subject areas have the most relevance with the research question.
INCLUSION CRITERIA	For Web of Science, subject areas such as "Business", "Computer science information systems", "Management", "Engineering electrical and electronic", "Engineering multidisciplinary", "Computer science artificial intelligence", "Computer science interdisciplinary applications", "Computer science software engineering", "Economics", "Education educational research", "Operations research management science" and "Telecommunications" have been included.	These subject areas have the most relevance with the research question.
INCLUSION CRITERIA	Articles, Conference paper, Book and Review are considered for document types.	This gives articles more credibility.

Table 10: Inclusion and Exclusion table

A.3 Defining the databases

After applying the search filters, the articles are read through each of their abstracts. If the article is applicable, they will be read thoroughly and are added to the concept matrix displayed in part 5. First an overview of the full systematic literature is displayed in Table 12.

Input Web of Science	Scope of Search	Date	Number of articles
("Business process management" OR "BPM" OR "BPMN" OR "Business process model and notation") AND (structur* OR improv* OR optimi*) AND ("Administration Tool" OR "Zendesk" OR "Administration software" OR "Customer service	All fields	27-04-2022 & 29-04-2022	14

software" OR "Service software" OR "Customer service")			
Input Scopus			
("Business process management" OR "BPM" OR "BPMN" OR "Business process model and notation") AND (structur* OR improv* OR optimi*) AND ("Administration Tool" OR "Zendesk" OR "Administration software" OR "Customer service software" OR "Service software" OR "Customer service")	TITLE-ABS-KEY in combination with ALL combinations of added clauses	27-04-2022 & 29-04-2022	93
Total combined articles			107
Removal of duplicates			-4
Removal after applying inclusion and exclusion criteria			-51
Removal after reading the title			-11
Removal of unavailable literature			-6
Removal after reading of the abstract			-20
Total eligible for research			15

Table 11: Systematic literature review

The unavailable literature was deemed unobtainable after trying to request the article from the original author.

A.4 Summary SLR

The remaining articles, see Table 13, were examined and summarized in a concept matrix, see Table 14

Author	Title	Publication Year
1. Alotaibi, Youseef; Liu, Fei	Average waiting time of customers in a new queue system with different classes	2013
2. Berner, Martin; Augustine, Jino; Maedche, Alexander	The Impact of Process Visibility on Process Performance: A Multiple Case Study of Operations Control Centres in ITSM	2016
3. Ferraris, Alberto; Monge, Filippo; Mueller, Jens	Ambidextrous IT capabilities and business process performance: an empirical analysis	2018
4. Frank, Lukas; Poll, Rouven; Roeglinger, Maximilian; Lea, Rupprecht	Design heuristics for customer-centric business processes	2020
5. Kazemzadeh, Yahya; Milton, Simon K.; Johnson, Lester W.	A Conceptual Comparison of Service Blueprinting and Business Process Modelling Notation (BPMN)	2015
6. Lau, Henry; Nakandala, Dilupa; Samaranayake, Premaratne; Shum, Paul K.	BPM for supporting customer relationship and profit decision	2016
7. Maddern, Harry; Smart, Philip Andrew; Maull, Roger S.; Childe, Stephen	End-to-end process management: implications for theory and practice	2014

8. Ponsignon, F.; Smart, P. A.; Maull, R. S.	Process design principles in service firms: Universal or context dependent? A literature review and new research directions	2012
9. Pufahl, Luise; Bazhenova, Ekaterina; Weske, Mathias	Evaluating the Performance of a Batch Activity in Process Models	2015
10. Trkman, Peter; Mertens, Willem; Viaene, Stijn; Gemmel, Paul	From business process management to customer process management	2015
11. Venkatraman, Sitalakshmi; Venkatraman, Ramanathan	Process Innovation and Improvement Using Business Object-Oriented Process Modelling (BOOPM) Framework	2019
12. Wurm, Bastian; Goel, Kanika; Bandara, Wasana; Rosemann, Michael	Design Patterns for Business Process Individualization	2019
13. Zaby, Christopher; Wilde, Klaus D.	Intelligent Business Processes in CRM: Exemplified by Complaint Management	2018
14. Zelt, Sarah; Recker, Jan; Schmiedel, Theresa; vom Brocke, Jan	A theory of contingent business process management	2019
15. Zelt, Sarah; Schmiedel, Theresa; vom Brocke, Jan	Understanding the nature of processes: an information-processing perspective	2018

Table 12: Full literature overview





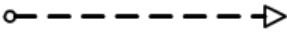
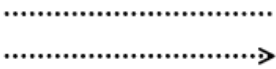



Concept Matrix					
Article #, Author	Creating a BPM/BPMN model	Process visibility/ analysis	Analytical hierarchy process/ Priority	Business process redesign	Customer relationship management
1. Alotaibi, Youseef; Liu, Fei			X		
2. Berner, Martin; Augustine, Jino; Maedche, Alexander		X			
3. Ferraris, Alberto; Monge, Filippo; Mueller, Jens		X		X	
4. Frank, Lukas; Poll, Rouven; Roeglinger, Maximilian; Lea, Rupprecht	X	X		X	
5. Kazemzadeh, Yahya; Milton, Simon K.; Johnson, Lester W.	X	X			
6. Lau, Henry; Nakandala, Dilupa; Samaranayake,			X	X	X

Premaratne; Shum, Paul K.					
7. Maddern, Harry; Smart, Philip Andrew; Mauil, Roger S.; Childe, Stephen		X			
8. Ponsignon, F.; Smart, P. A.; Mauil, R. S.	X				
9. Pufahl, Luise; Bazhenova, Ekaterina; Weske, Mathias	X	X			
10. Trkman, Peter; Mertens, Willem; Viaene, Stijn; Gemmel, Paul	X				X
11. Venkatraman, Sitalakshmi; Venkatraman, Ramanathan	X			X	
12. Wurm, Bastian; Goel, Kanika; Bandara, Wasana; Rosemann, Michael		X			
13. Zaby, Christopher; Wilde, Klaus D.		X			X
14. Zelt, Sarah; Recker, Jan; Schmiedel, Theresa; vom Brocke, Jan		X			
15. Zelt, Sarah; Schmiedel, Theresa; vom Brocke, Jan		X			

Table 13: Concept matrix SLR

Appendix B: BPMN modelling

B.1 Basics

Element	Description	Notation
Event	An Event is something that “happens” during the course of a Process (see page 238) or a Choreography (see page 339). These Events affect the flow of the model and usually have a cause (<i>trigger</i>) or an impact (<i>result</i>). Events are circles with open centers to allow internal markers to differentiate different <i>triggers</i> or <i>results</i> . There are three types of Events, based on when they affect the flow: Start, Intermediate, and End.	
Activity	An Activity is a generic term for work that company performs (see page 151) in a Process. An Activity can be atomic or non-atomic (compound). The types of Activities that are a part of a Process Model are: Sub-Process and Task, which are rounded rectangles. Activities are used in both standard Processes and in Choreographies.	
Gateway	A Gateway is used to control the divergence and convergence of Sequence Flows in a Process (see page 145) and in a Choreography (see page 344). Thus, it will determine branching, forking, merging, and joining of paths. Internal markers will indicate the type of behavior control.	
Sequence Flow	A Sequence Flow is used to show the order that Activities will be performed in a Process (see page 97) and in a Choreography (see page 320).	
Message Flow	A Message Flow is used to show the flow of Messages between two <i>Participants</i> that are prepared to send and receive them (see page 120). In BPMN, two separate Pools in a Collaboration Diagram will represent the two <i>Participants</i> (e.g., <i>PartnerEntities</i> and/or <i>PartnerRoles</i>).	
Association	An Association is used to link information and Artifacts with BPMN graphical elements (see page 67). Text Annotations (see page 71) and other Artifacts (see page 66) can be Associated with the graphical elements. An arrowhead on the Association indicates a direction of flow (e.g., data), when appropriate.	
Pool	A Pool is the graphical representation of a <i>Participant</i> in a Collaboration (see page 112). It also acts as a “swimlane” and a graphical container for partitioning a set of Activities from other Pools, usually in the context of B2B situations. A Pool MAY have internal details, in the form of the Process that will be executed. Or a Pool MAY have no internal details, i.e., it can be a “black box.”	
Lane	A Lane is a sub-partition within a Process, sometimes within a Pool, and will extend the entire length of the Process, either vertically or horizontally (see on page 305). Lanes are used to organize and categorize Activities.	
Data Object	Data Objects provide information about what Activities require to be performed and/or what they produce (see page 205). Data Objects can represent a singular object or a collection of objects. Data Input and Data Output provide the same information for Processes.	




Message	A Message is used to depict the contents of a communication between two <i>Participants</i> (as defined by a business PartnerRole or a business PartnerEntity—see on page 93).	
Group (a box around a group of objects within the same category)	A Group is a grouping of graphical elements that are within the same Category (see page 70). This type of grouping does not affect the Sequence Flows within the Group. The Category name appears on the diagram as the group label. Categories can be used for documentation or analysis purposes. Groups are one way in which Categories of objects can be visually displayed on the diagram.	
Text Annotation (attached with an Association)	Text Annotations are a mechanism for a modeler to provide additional text information for the reader of a BPMN Diagram (see page 71).	

Table 14: Basic modelling notation (Object Management Group, Inc. (OMG), 2011)

B.2 Parallel and Event timed- gateways

The parallel gateways are part of the extended set of the gateway control types. They allow for dynamic modelling. *Figure 4* showcases the notation of these gateways. The function of a parallel gateway is to create parallel flows, without checking any conditions. This means that it can start two processes simultaneously without the need of a condition check. For incoming it flows waits till it has received all incoming flow tokens before triggering its outgoing sequence flows (Object Management Group, Inc. (OMG), 2011).

The Event-Based Gateway represents a branching point in the Process where the alternative paths that follow the Gateway are based on Events that occur, rather than the evaluation of Expressions using Process data (Object Management Group, Inc. (OMG), 2011).

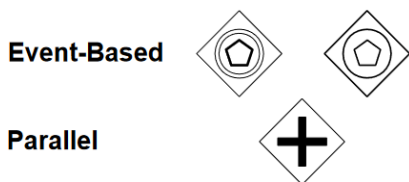


Figure 18: Notation of Event-based and parallel gateways (Object Management Group, Inc. (OMG), 2011)

B.3 Signal events

This event is used to send or receive signals. A signal allows for general communication between pools, process levels and business process diagrams. They allow the user to create conditional start events based on signalled conditional end events (Object Management Group, Inc. (OMG), 2011). *Figure 5* displays the notations used for the signal start (green) and signal end(red).



Figure 19: Signal start and end event notation (Bizagi Modeler, 2022)

B.4 Sub-processes

A Sub-Process (see *Figure 6*) is an Activity whose internal details have been modelled using Activities, Gateways, Events, and Sequence Flows. A Sub-Process is a graphical object within a Process, but it also can be “opened up” to show a lower-level Process. Sub-Processes define a contextual scope that can be used for attribute visibility, transactional scope, for the handling of exceptions of Events, or for compensation (Object Management Group, Inc. (OMG), 2011). This allows processes not becoming cluttered and undecipherable.

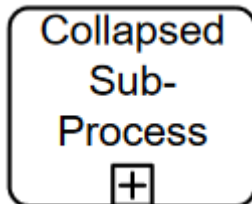


Figure 20: Notation of the sub-process used in the thesis (Object Management Group, Inc. (OMG), 2011)

B.5 Types of Tasks

There are different types of Tasks (see *Figure 8*) identified within BPMN to separate the types of inherent behaviour that Tasks might represent, this is useful to locate optimization. In BPMN 2.0 these tasks are:

- Service Task: a Task that uses some sort of service, which could be a Web service or an automated application.
- Send Task: a simple Task that is designed to send a Message to an external Participant (relative to the Process). Once the Message has been sent, the Task is completed.
- Receive Task: a simple Task that is designed to wait for a Message to arrive from an external Participant (relative to the Process). Once the Message has been received, the Task is completed.
- User Task: a typical “workflow” Task where a human performer performs the Task with the assistance of a software application and is scheduled through a task list manager of some sort.
- Manual Task: A Task that is expected to be performed without the aid of any business process execution engine or any application

(Object Management Group, Inc. (OMG), 2011)

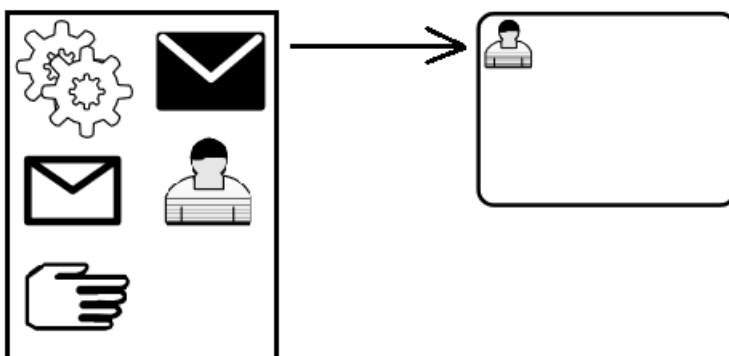


Figure 21: Types of user tasks (Object Management Group, Inc. (OMG), 2011)

B.6 Intermediate events

An intermediate indicates where something happens between the start and end process. This thesis will make use of the Timer Intermediate Event, which acts as a delay mechanism based on a specific time-date or a specific cycle (Object Management Group, Inc. (OMG), 2011).



Figure 22: Timer intermediate event (Object Management Group, Inc. (OMG), 2011)

Appendix C: Zendesk UI

C.1 Current system display

Any detectable private information has been blurred out. Black circles in figures are explained in the legend below

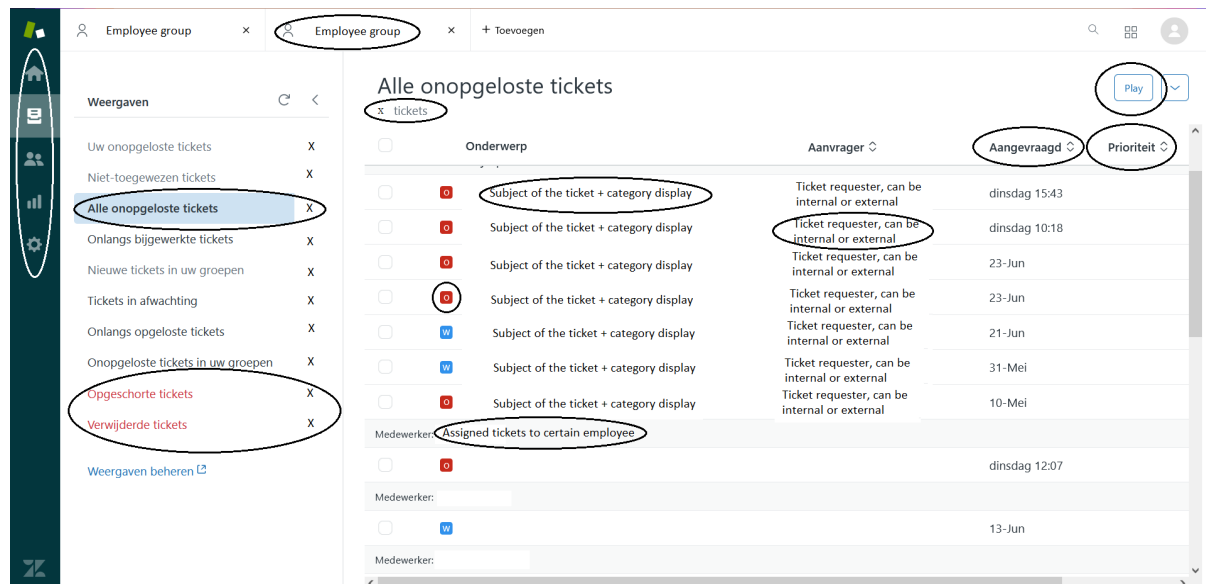


Figure 23: Main workspace employee

Legend:

- Left sidebar, from top to bottom:
 - Option to go to the homepage which showcases all new tickets
 - Option to go to the workspace, current view.
 - Option to see an overview of all customers.
 - Option to see Zendesk data
 - Option for admin to change settings
- Employee group
 - Showcases which tickets are open with, the assigned ticket number and requester of the ticket.
- X tickets
 - Showcases how many tickets are still unsolved in this page
- Aangevraagd
 - Date that the ticket came into the system
- Prioriteit
 - Priority system, can be displayed as urgent
- Bijgewerkt
 - Last update date of when it was edited internally or externally
- Subject of the ticket + category display
 - Employee has to fill this in manually to the best of their ability assuming what type of question the customer has
- Assigned tickets to certain employee
 - You can assign existing or new tickets to a certain employee
- Alle onopgeloste tickets
 - Highlights the amount of unsolved tickets

- Red O
 - Status of the ticket, can be open (red O), new (yellow N), Waiting (blue W) or Solved (grey S)
- Opgeschorte en verwijderde tickets
 - Tickets that have been removed due to not being relevant or spam
- Play button
 - Option that is there by Zendesk but is not currently used

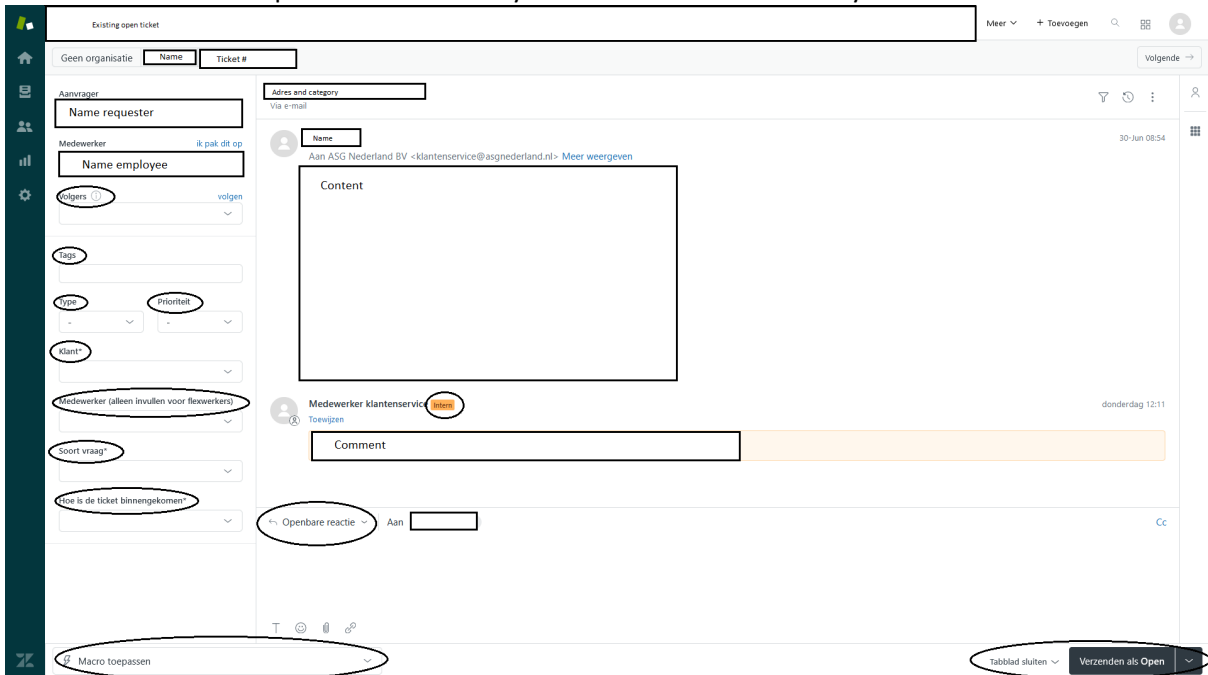


Figure 24: Inside an open ticket

Legend:

- Volgers
 - Followers of a ticket
- Tags
 - Tags will be automatically added when questions with a “*” are answered.
- Type
 - Specify what type of ticket it is, choosing between question, problem, task or incident
- Prioriteit
 - Specify urgency, choosing between low medium high and urgent
- Klant
 - Specify the customer group
- Mederwerker (alleen invullen voor flexwerkers)
 - Specify which part-time employee is working on this ticket
- Soort vraag
 - Category question which determines the title, ranges from invoice to installing meters
- Hoe is de ticket binnengekomen
 - Specify how the ticket came through, choices are through phone mail or internally
- Intern

- Showcases the content of the message as yellow, this means that customers can be discussed with other employees before giving an answer
- Openbare reactie
 - Choose how you would like to reply, openbare reactive here means that the name requester will get a response, you can also set it to internally to discuss further details
- Macro toepassen
 - Apply an arranged set of text as a common reply to certain tickets, currently rarely used
- Verzenden als open
 - Choose how you would want to reply to the ticket, choice between open waiting or solved.

C.2 New triggers and automations

Triggers need to be added in the admin panel of Zendesk. The following triggers are added:

Trigger name	Auto complaint
Description	When a ticket put complaint in the title it will auto forward to the employee who's responsible
Category	Incoming mail
Condition	All Subject text – Includes one of the following words – Complaint, Objection, Protest
Action	Assign employee- Ellen

Trigger name	Auto Eline Home
Description	When Eline-home is mentioned alongside login send it to the designated employee
Category	Incoming mail
Condition	All Subject text – Includes one of the following words – Eline home, Elinehome, Eline AND All subject text – Includes one of the following words – Login, inloggen
Action	Assign employee- Bram Add tags – vraag_Eline_home

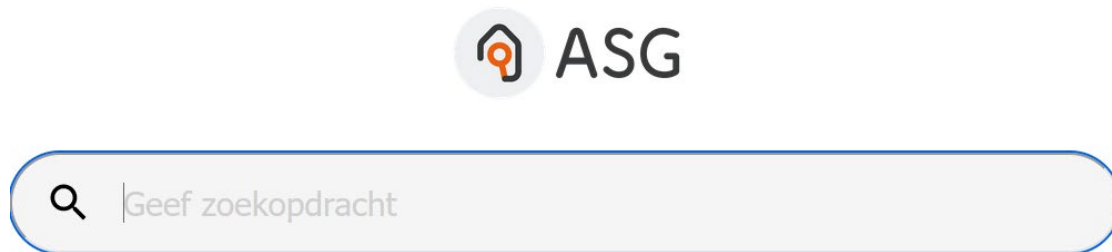
Automations are used for time-based events

Automation title	Reminder
Fulfilled requirement (Fully)	Ticket: Hours since assigned- is- 120
Fulfilled requirement (Fully)	Ticket: Status -is- Open
Action	Change priority to high

Appendix E: New database overview

Note to reader, the design methodology of this tool is backed up by the research of this thesis, however the creation and building is not!

An employee first starts out with a tool that looks similar to google,



Data ready

Figure 27: Search tool starting interface

The tool can search the following information on a customer:

Name
Address
ComplexID
Meter reset-date
Postal code
Building complex name
City
Living corporation

It will showcase all this information on the searching page. Also, it shows closest results to the search input in-case the address or name is misspelled, this is shown in *Figure 29*. After selecting a result, additional information about the customer is shown, see *Figure 28*

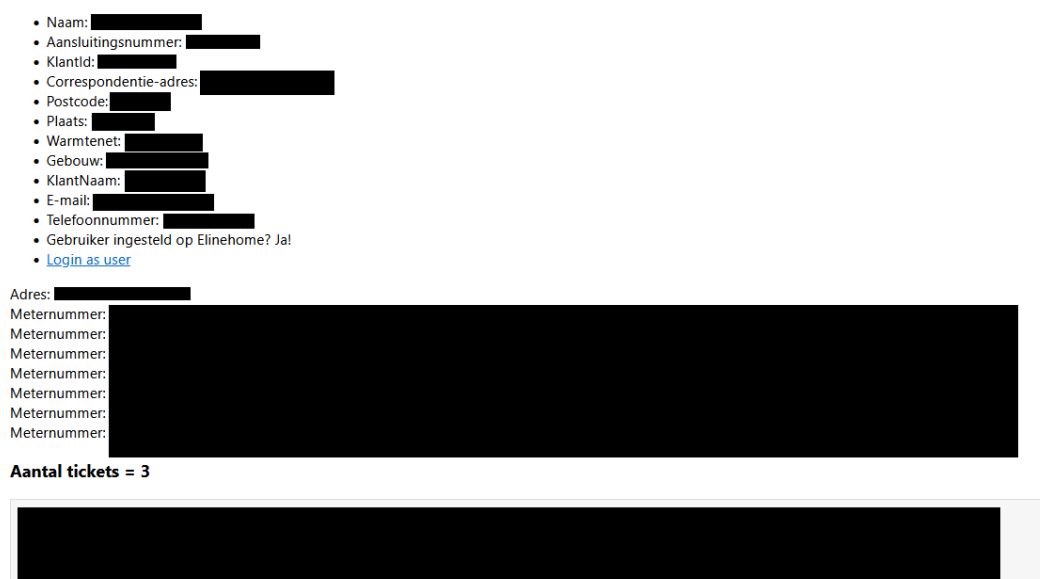


Figure 28: Inside a search result

Address

Data ready

Naam: [REDACTED] Edap: 31-05	Adres: [REDACTED] Postcode: [REDACTED] Plaats: ENSCHEDE	Warmtenet: [REDACTED] Gebouw: [REDACTED] Klantnaam: [REDACTED]
Naam: [REDACTED] Edap: 31-05	Adres: [REDACTED] Postcode: [REDACTED] Plaats: ENSCHEDE	Warmtenet: [REDACTED] Gebouw: [REDACTED] Klantnaam: [REDACTED]
Naam: [REDACTED] Edap: 31-05	Adres: [REDACTED] Postcode: [REDACTED] Plaats: ENSCHEDE	Warmtenet: [REDACTED] Gebouw: [REDACTED] Klantnaam: [REDACTED]
Naam: [REDACTED] Edap: 31-05	Adres: [REDACTED] Postcode: [REDACTED] Plaats: ENSCHEDE	Warmtenet: [REDACTED] Gebouw: [REDACTED] Klantnaam: [REDACTED]

Figure 29: Search results after address input