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Master's Thesis
Business Process Modeling Using BPMN

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DIPLOMA THESIS ASSIGNMENT

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Informatics

Thesis title

Business Process Modeling Using BPMN

Objectives of thesis

The main objective of this thesis is to analyze the business process in a modern-day data driven company. Therefore, determine potential problems and suggest improvements.

The partial goals of the thesis is to visualize business process with business process modeling notations.

Methodology

The theoretical part is based on the systematic review of business process models and the current business model with the help of surveys, researches, public market data, written or online published sources.

Followed by analyze and improvement of current business model with business process model and notation.

The proposed extent of the thesis

60-80

Keywords

Business Process Modeling, BPMN, data driven company

Recommended information sources

FREUND, Jakob a Bernd RÜCKER. Real-Life BPMN. 4. Independently published (September 4, 2019), 2019. ISBN 1086302095.

KENNETH, J Sherry. Business Process Collaboration: A Course Book on Designing, Modelling and Understanding Business Process Collaboration Essentials using BPMN Version 2.0. Scotts Valley, California: CreateSpace Independent Publishing Platform, 2014. ISBN 978-1494400217.

Object Management Group Business Process Model and Notation [online]. [cit. 2020-10-10]. Dostupné z: <http://www.bpmn.org>

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Declaration

I declare that I have worked on my master's thesis titled "Business Process Modeling Using BPMN" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 31.03.2024

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Business Process Modeling Using BPMN

Abstract

This diploma thesis approaches the creation, analysis and optimization of the business process models in SNBN S.R.O. The main goal was to create the company's business processes with business process model and notation (BPMN) tool. Based on the meetings with shareholders, the indistinct business flows were created. Customer Lifecycle flow has been selected to further be analysed and optimised. This workflow has three separate business processes: Lead Generation, Project Implementation and Customer Success Management. Discussions with team members provide different perspectives about the business processes and assists through finding the bottlenecks and optimize them. Camunda is selected to visualise business processes in BPMN for its highly customizable, scalable, and flexible features. Optimize processes were presented to the shareholders, demonstrated on two different customers who were at the beginning of their related business process journey. Then it is decided to further assess the optimization in the organization. The models are evaluated by time efficiency, customer satisfaction and financial benefits. This analysis shows that if the steps applied in correct order with the right documentations and automations of manual tasks, the time efficiency and customer success will increase, and it will bring financial benefits along.

Keywords: BPMN, process modeling, optimization, project, customer success, lead generation, process

Modelování podnikových procesů pomocí BPMN

Abstrakt

Tato diplomová práce se zabývá vytvářením, analýzou a optimalizací modelů podnikových procesů ve společnosti SNBN S.R.O. Hlavním cílem bylo vytvořit podnikové procesy společnosti pomocí nástroje pro modelování a notaci podnikových procesů (BPMN). Na základě jednání se společníky byly vytvořeny nejasné podnikové toky. Tok životního cyklu zákazníka byl vybrán k další analýze a optimalizaci. Tento tok práce se skládá ze tří samostatných podnikových procesů: generování potenciálních zákazníků, implementace projektu a řízení úspěchu zákazníka. Diskuse s členy týmu poskytují různé pohledy na podnikové procesy a pomáhají najít úzká místa a optimalizovat je. Pro vizualizaci podnikových procesů v BPMN byl vybrán nástroj Camunda díky svým vysoko přizpůsobitelným, škálovatelným a flexibilním funkcím. Optimalizované procesy byly představeny společníkům a demonstrovány na dvou různých zákaznících, kteří byli na začátku svého podnikového procesu. Poté bylo rozhodnuto o dalším hodnocení optimalizace ve společnosti. Modely jsou hodnoceny z hlediska časové efektivity, spokojenosti zákazníků a finančních přínosů. Tato analýza ukazuje, že pokud jsou kroky provedeny v správném pořadí s odpovídající dokumentací a automatizací manuálních úkolů, zvýší se časová efektivita a úspěch zákazníka a přinese finanční přínosy.

Klíčová slova: BPMN, modelování procesů, optimalizace, projekt, úspěch zákazníka, generování potenciálních zákazníků, proces

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1. Introduction

Business processes are the key factors of organisations as they are the one truth of how tasks are performed. It is not uncommon that an organisation can have hard times to deliver efficiently as they planned because of errors in their business processes. This situation unfortunately affects the costs of business, possible opportunities, and customer satisfaction negatively.

Business process management (BPM) is a holistic system that covers the management and optimization of business processes in an organisation (Hammer et al., 2010).

BPM enables organizations to align their business processes with their business aspirations, improve performance of operations, and encourage innovation. With the use of technology platforms and software solutions, it supports to automate and optimize business processes, enable organizations to become more efficient and agile. (IBM, n.d.)

Whereas implementing BPM can have significant benefits such as improving efficiency and customer satisfaction, the process itself can be complicated and confusing for organizations. Especially when the stakeholders of processes are unfamiliar with the business process management.

This thesis aims to address and provide a solution to this challenge by analysing the business processes in SNBN S.R.O., and furthermore identifying and improving the bottlenecks by using business process model and notation (BPMN) tools.

This thesis has two parts. The first part focuses on the details of business process and business process management and provides information about business process management notation to assist the reader in understanding processes better. Then an open-source BPMN tool will be selected based on their features.

In the second practical part, the business processes of SNBN S.R.O. will be visualised as is, bottlenecks will be identified and optimised. The results will be evaluated.

2. Objectives and Methodology

2.1 Objectives

The objectives of this thesis are to understand the business process of SNBN S.R.O, identify the key bottlenecks in business processes, analyse the impact of these bottlenecks on SNBN's performance, develop and implement process improvements using BPMN tools, and evaluate the effectiveness of these process improvements in terms of efficiency, cost savings, and customer satisfaction.

2.2 Methodology

The methodology for identifying and improving business process bottlenecks involves several key steps.

Firstly, meetings will be conducted with management and team leaders. The purpose of these meetings is to gather insights about their business processes as is.

Next, the identified business processes will be analysed using BPMN tools. This analysis will involve process mapping, identification of bottlenecks, and analysis of frequently faced or major issues that happened in the last 2 years. The BPMN tools will provide a visual representation of the processes, making it easier to identify areas for improvement.

Based on the analysis, process improvements will be developed and implemented using BPMN tools. These improvements may include process redesign, automation, and optimization. The goal is to streamline the processes and eliminate or minimize the bottlenecks identified earlier.

Finally, the effectiveness of the process improvements will be evaluated. This evaluation will consider factors such as efficiency, cost savings, and customer satisfaction. Process metrics will be analysed before and after the improvements, and feedback from management will be collected. This evaluation will help determine the impact of the improvements and identify any areas that may require further refinement.

3. Literature Review

3.1 Overview of Business Process Management (BPM)

3.1.1 Definition of Business Process Management (BPM)

Business processes are kind of a template to show how a set of actions is orchestrated to deliver the desired output. Each business process has a trigger to start to process, one or multiple inputs and ends with beneficial deliverables.

Business process management (BPM) is a systematic approach to improving organisational processes. According to Dumas et al. (2013), BPM involves "the design, execution, monitoring, and optimization of business processes with the goal of achieving organisational goals and objectives."

BPM helps organizations centralize their operations, enhance customer satisfaction, and achieve their strategic goals. It involves the use of various tools, techniques, and methodologies to analyse, model, implement, and evaluate business processes. (Red Hat, n.d.)

The aspects of BPM can be summarised in these steps:

- Process Automation: Eliminate manual tasks and reduce the risk of errors.
- Collaboration: Increase collaboration and communication among stakeholders involved in a business process.
- Continuous Improvement: Regularly analysing and evaluating processes to identify bottlenecks, inefficiencies, and areas for improvement.
- Process Monitoring and Analytics: Monitor and track the performance of own business processes.
- Compliance and Governance: A mechanisms for documenting and enforcing process controls, ensures that processes are executed in a consistent and compliant manner.
- Customer Experience: Can improve customer satisfaction, reduce response times, and deliver a seamless customer journey. (Kissflow, n.d.)

3.1.2 Stages of BPM Optimization

BPM stages can be grouped in three main stages: Identify, Redesign, Continuous Improvement.

The first stage of BPM is to identify the current business processes as is and map out in one of the business processing techniques. During this exercise, it will be possible to detect problematic process, and repetitive tasks. This visualization will simplify the observation of improvement potentials.

In the second stage of BPM, the process is redesigned with the aim to reduce cost/increase income, and improve efficiency, quality, time, and consumer satisfaction. BPM aspects are Processes can be optimized by eliminating duplicate or non-value steps, decreasing complexity, or automating.

Finally, BPM should be continuously improved. Each process, redesigned or not, should constantly be evaluated and refined to ensure that they are aligned with the requirements of the organisation.

3.1.3 Analysis of Business Processes

A business process can be analysed by 2 different approaches after the workflow is created: token analysis and arity analysis.

A token is the material that passes between steps. In token analysis. firstly, an object should be determined in the flow of work. Then, this object should be named in each step. The steps where the token changes name, are the handover steps and marks the start of a new process.

In arity analysis, the required instances are compared with the neighbouring steps. If both steps require equal instances each, they are in the same step, but when a step can use more than the other, it marks the end of one process and the start of the other.

Here is the example of having a homemade meal analysed by both approaches and business processes:

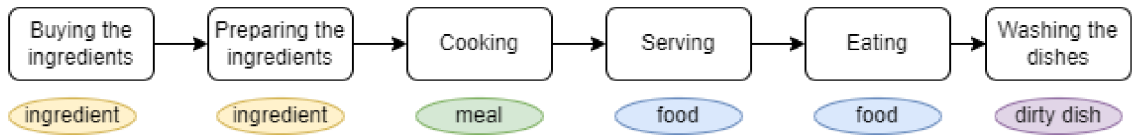


Figure 1 - Token Analysis of business flow. Source: Author

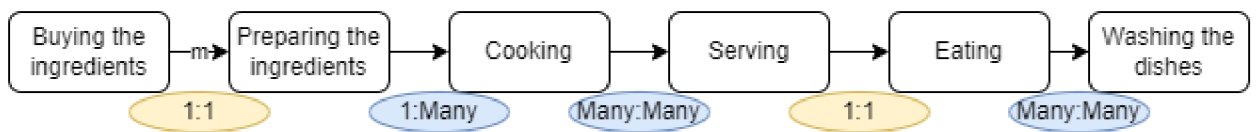


Figure 2 - Arity Analysis of business flow. Source: Author

Based on the analysis, having a homemade dinner has 4 different business processes:

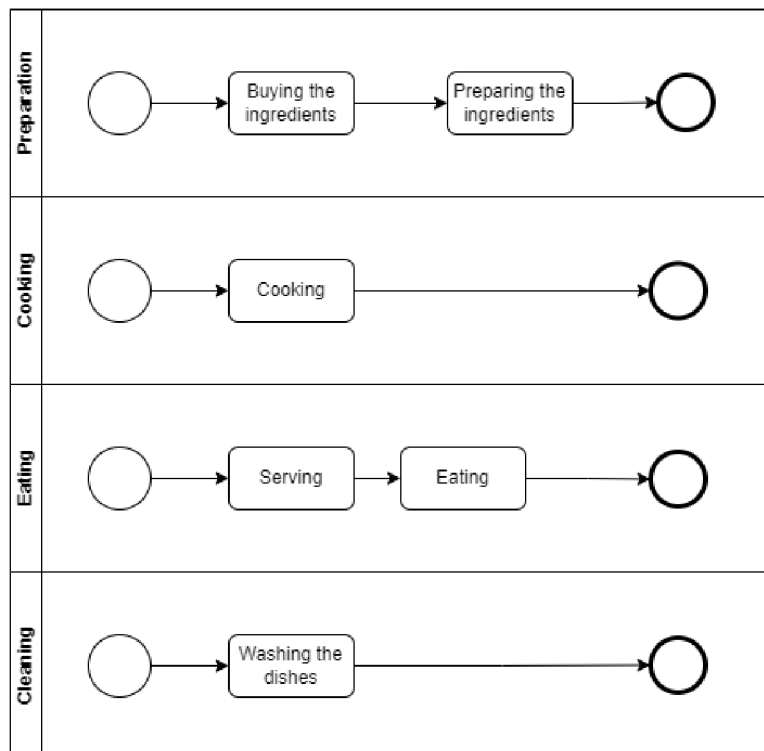


Figure 3 - Business Process in analysed flow. Source: Author

3.1.4 Measuring the Performance of Business Processes

Performance of business can be measured by different key performance metrics. These metrics should be continuously monitored for keeping the process optimized through the changing strategies of the organization, requirements of market, and demands of customers.

These measurements are:

- How well process and client expectations are aligned.
- How much of the client demands are delivered by the end of the process.
- How long the process takes.
- How much it costs, including the source and delivery.
- How efficiently sources are used during the process.
- How many deliverables are created during the process.
- How well the inputs are defined and received.
- How well the process follows third-party standards demanded by the sector such as ISO.

(Business Mapping, n.d).

3.2 Business Process Modelling Tools

3.2.1 Flowchart

Flowchart is a visualization of a process or an algorithm that uses various symbols to depict the steps, decisions, and flow of information. It is a tool with graphics that helps in grasping and documenting complex processes in a clear and concise manner. (Techopedia, n.d.)

Flowcharts are broadly used in different industries, including development, business process management, and project management. Flowcharts support teams to visualize the entire process and make informed decisions based on the flowchart's representation. (Lucidchart, n.d.)









Flowchart Symbol	Name	Description			
	Process symbol	Also known as an "Action Symbol," this shape represents a process, action, or function. It's the most widely-used symbol in flowcharting.		Connector symbol	Usually used within more complex charts, this symbol connects separate elements across one page.
	Start/End symbol	Also known as the "Terminator Symbol," this symbol represents the start points, end points, and potential outcomes of a path. Often contains "Start" or "End" within the shape.		Off-Page Connector/Link symbol	Frequently used within complex charts, this symbol connects separate elements across multiple pages with the page number usually placed on or within the shape for easy reference.
	Document symbol	Represents the input or output of a document, specifically. Examples of and input are receiving a report, email, or order. Examples of an output using a document symbol include generating a presentation, memo, or letter.		Input/Output symbol	Also referred to as the "Data Symbol," this shape represents data that is available for input or output as well as representing resources used or generated. While the paper tape symbol also represents input/output, it is outdated and no longer in common use for flowchart diagramming.
	Decision symbol	Indicates a question to be answered — usually yes/no or true/false. The flowchart path may then split off into different branches depending on the answer or consequences thereafter.		Comment/Note symbol	Placed along with context, this symbol adds needed explanation or comments within the specified range. It may be connected by a dashed line to the relevant section of the flowchart as well.

Figure 4 - Most common flowchart symbols. Source: (11)

3.2.2 UML

UML (Unified Modelling Language) is a standardized visual modelling language used in software engineering to represent and document software systems by visuals. It provides a set of graphical notations and symbols that simplify the illustration of complicated systems and their instruments. (Object Management Group (OMG), n.d.)

There are multiple types of UML diagrams, each serving a specific purpose in modelling different phase of a software system. Some of the commonly used UML diagrams are:

- Class Diagram: Represents the static structure of a system, such as classes, attributes, methods, and their relationships.

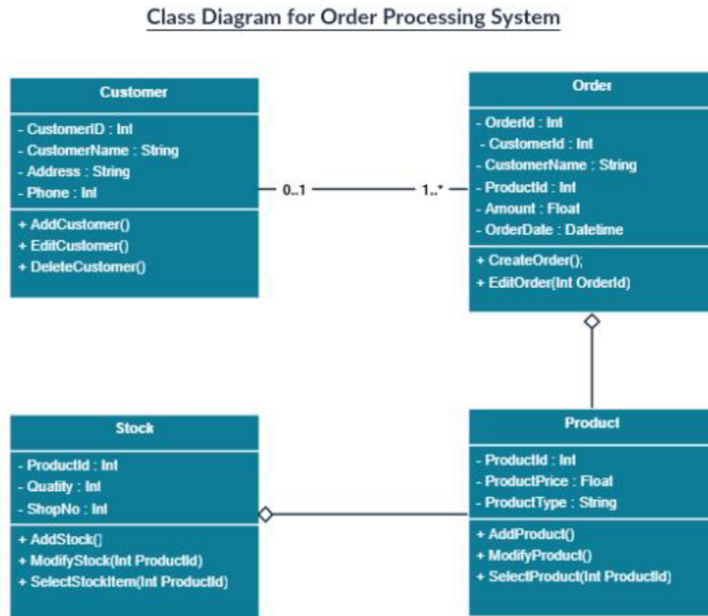


Figure 5 - Class Diagram for Order Processing System. Source: (17)

- Use Case Diagram: Illustrates the interactions between actors (users or external systems) and the system and shows the system's functionality from a user's perspective.

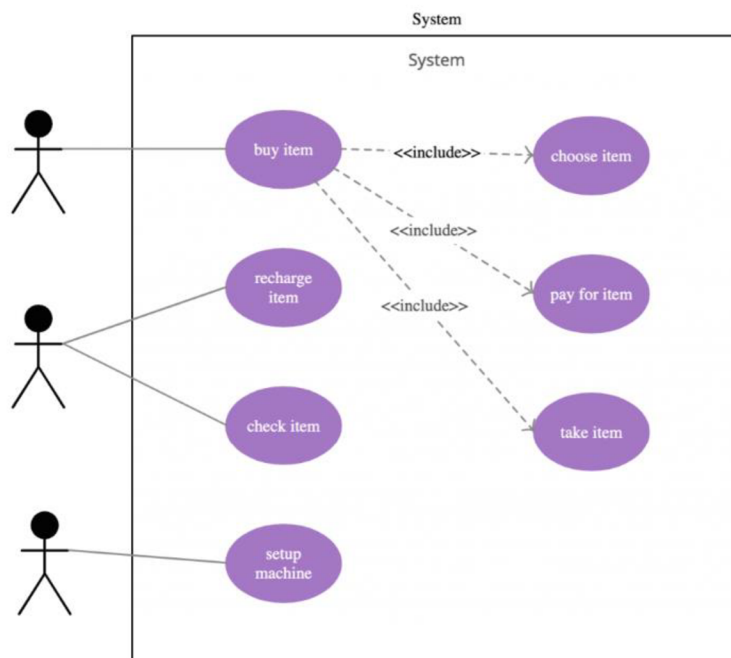


Figure 6 - Use Case Diagram. Source: (17)

- Sequence Diagram: Portrays the interactions between objects in a system by time, showing the order of messages exchanged between objects.

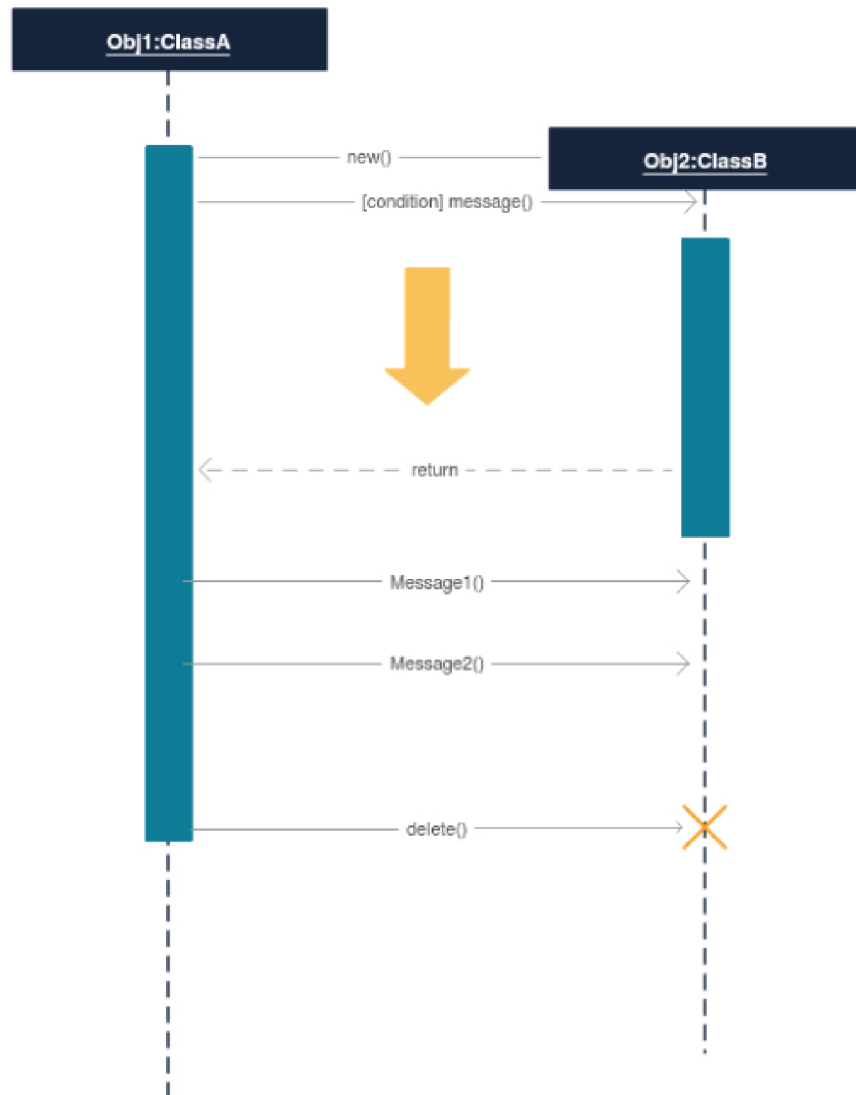


Figure 7 - Sequence Diagram. Source: (17)

- Activity Diagram: Illustrates the flow of activities or processes within a system by displaying the sequence of actions and decisions.

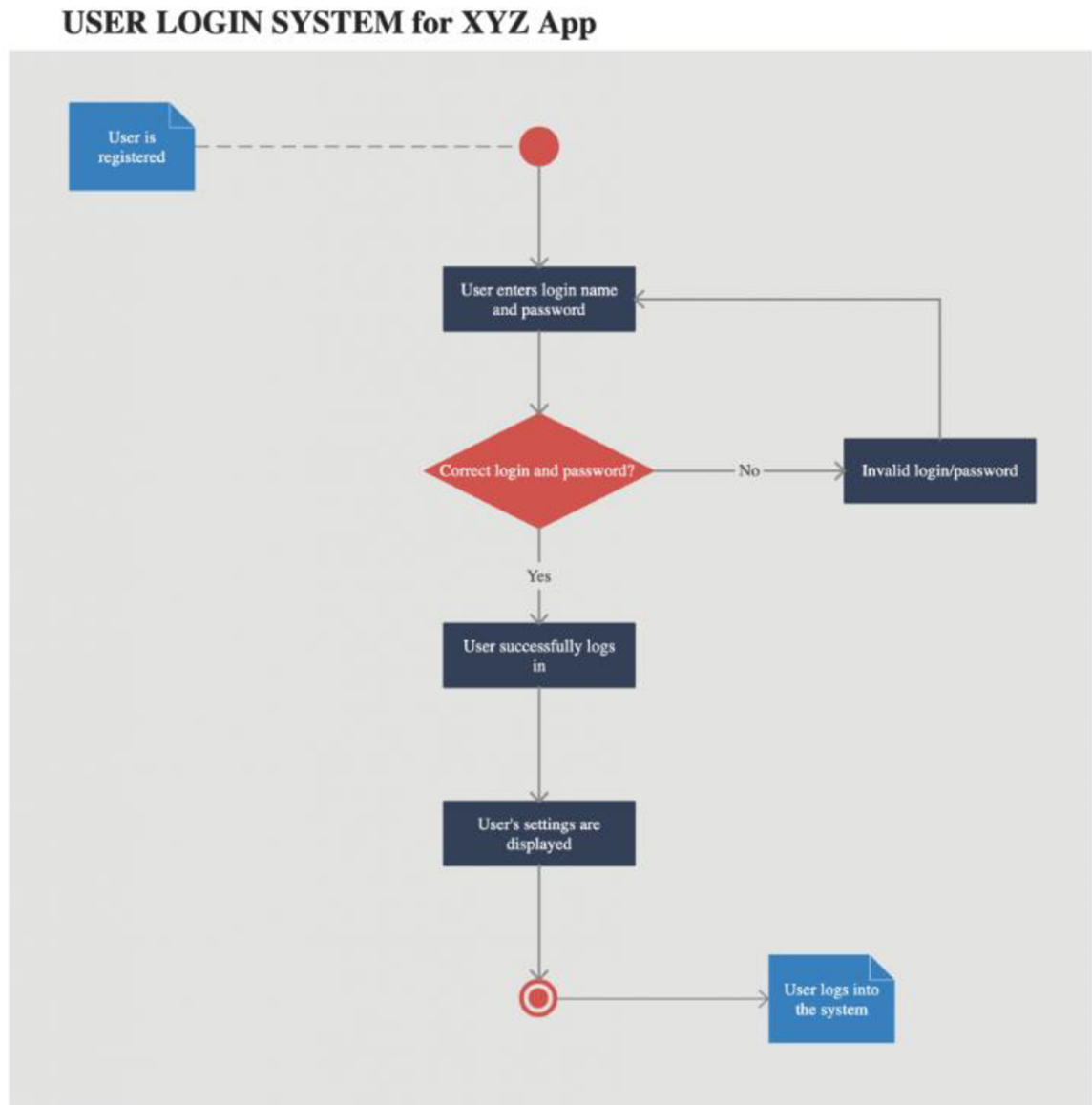


Figure 8 - Activity Diagram. Source: (17)

- State Machine Diagram: Models the behaviour of an object or system by representing its states, events, and transitions between states. (Lucidchart, n.d.)

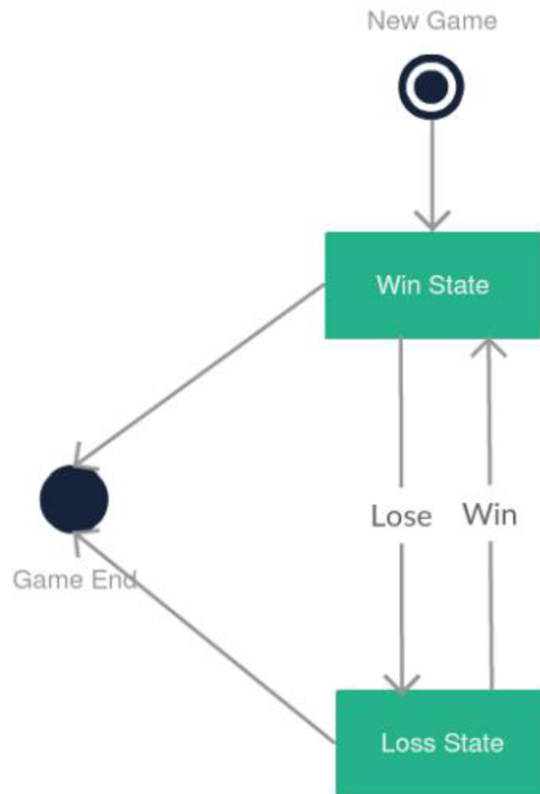


Figure 9 - State Machine Diagram. Source: (17)

3.2.3 BPMN

BPMN is an extensively used standard for modelling business processes. It allows organizations to create visual models of their own business processes, including the activities, events, gateways, and flows. BPMN is a standardized way of representing business processes, making it easier for stakeholders to understand and communicate about the processes. (BPMN.org,n.d.)

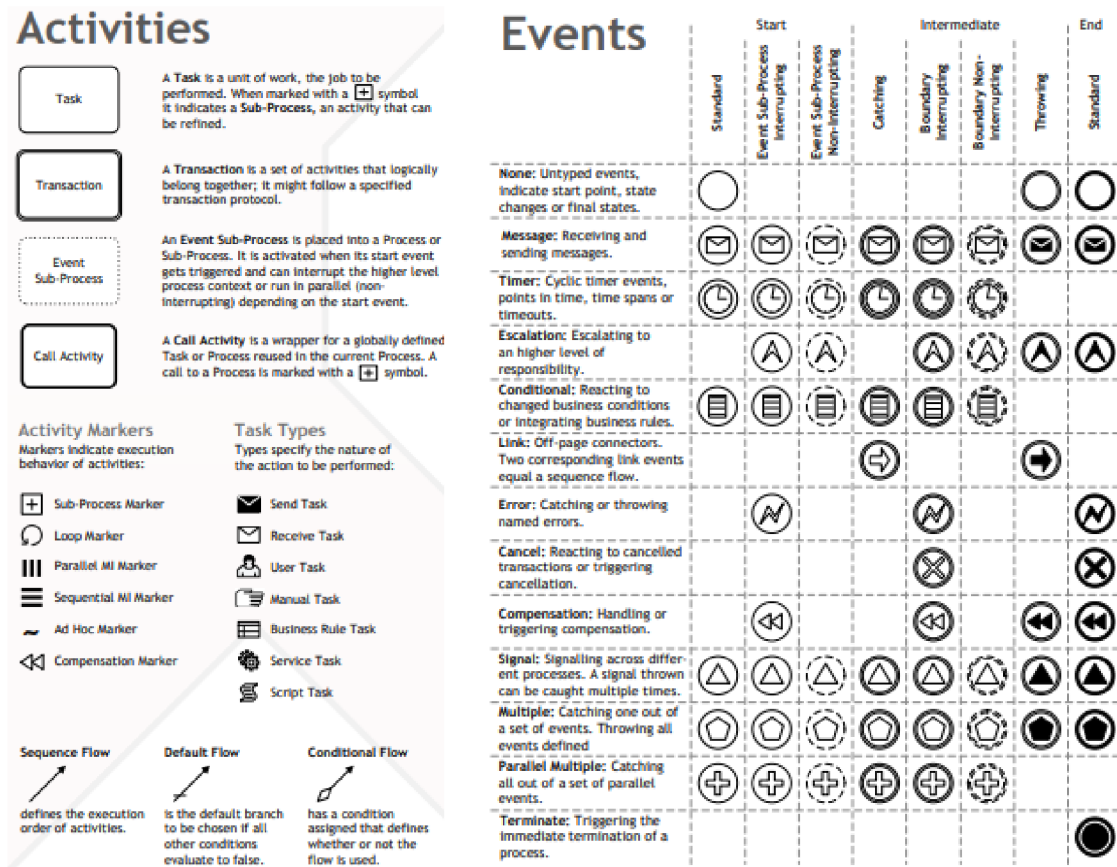


Figure 10- BPMN Activities and Events. Source: (8)

There are different types of BPMN diagrams. Some of the commonly used BPMN diagrams include:

- **Process Diagram:** Represents the overall flow of a business process, including its activities, events, gateways, and flows.

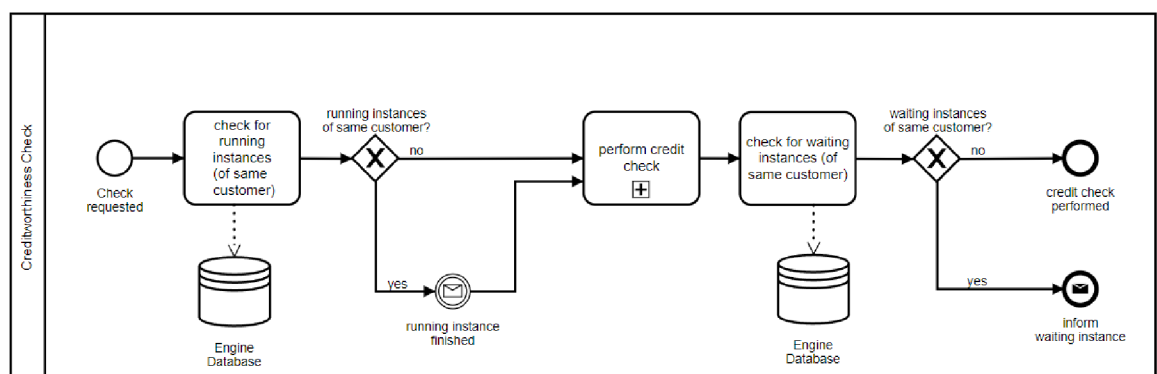


Figure 11- Process Diagram. Source: (9)

- Collaboration Diagram: Represents the interactions and collaborations between different participants (individuals, organizations, or systems) in a business process.

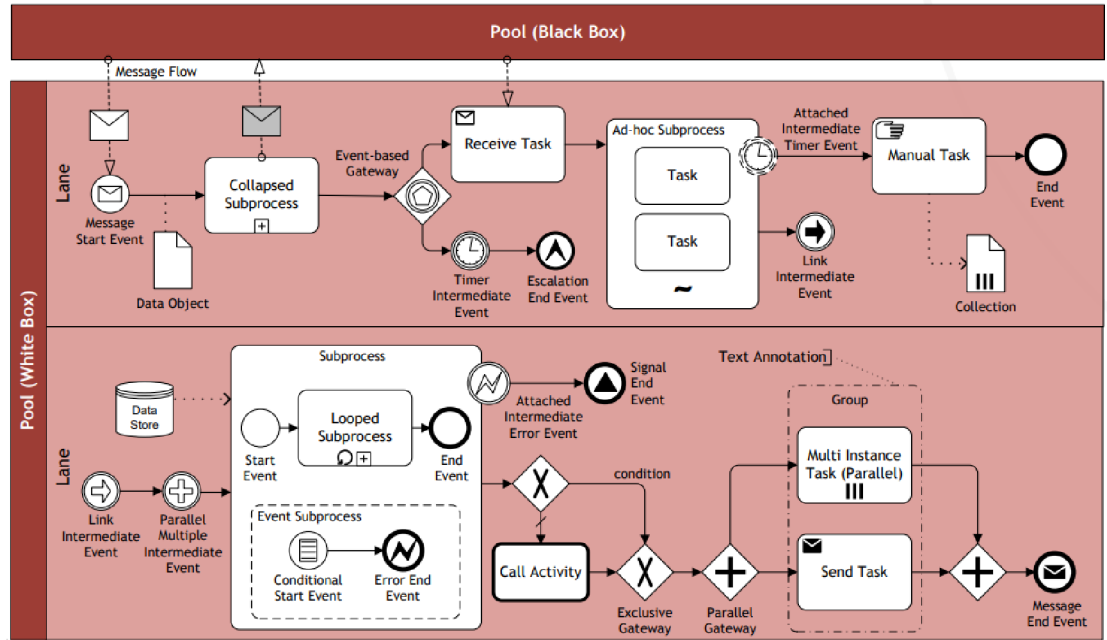


Figure 12 - Collaboration Diagram. Source: (8)

- Choreography Diagram: Displays the interactions and communications between multiple participants in a business process. The sequence of messages exchanged are shown.

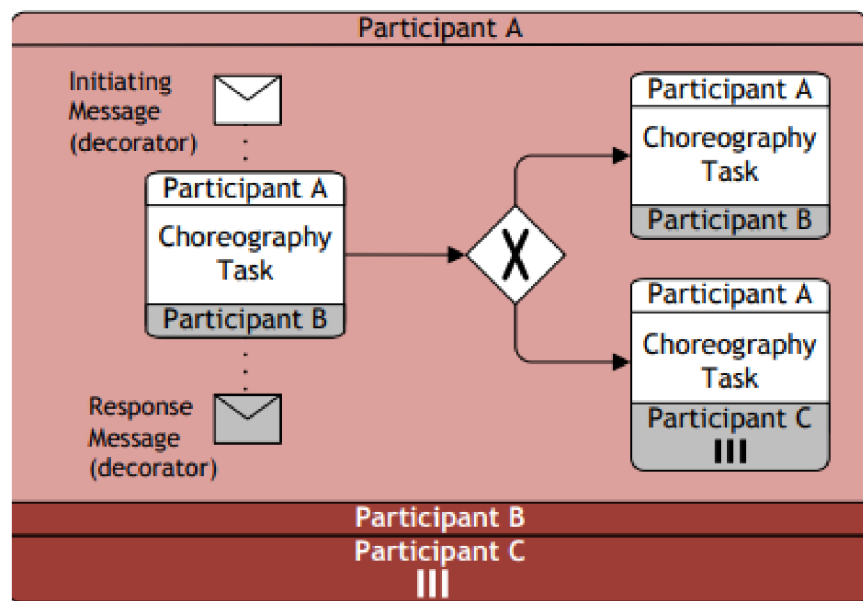


Figure 13 - Choreography Diagram. Source: (8)

- Conversation Diagram: Models the conversations and message flows between participants in a business process to display the exchange of information. (Visual Paradigm, n.d.)

Conversation Diagram

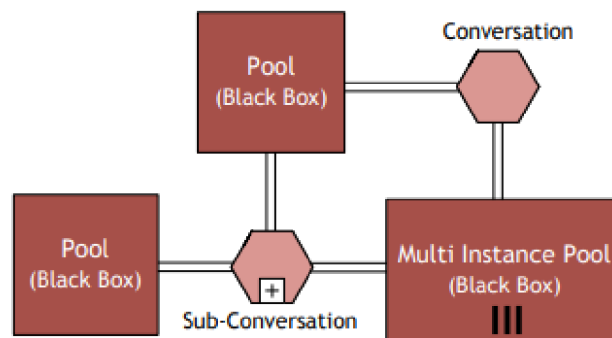


Figure 14 - Conversation Diagram. Source: (8)

3.3 Selection of BPMN tool

There are multiple open-source and proprietary BPMN tools on the market that provides workflow automation, process modelling, decision management, and analytics.

According to a comparison of open-source business process management (BPM) tools conducted by Capital One Tech (2022) and Solutions Review (n.d.)

- Camunda is highly customizable, scalable, and flexible BPMN tool but it also has steep learning curve and requires technical expertise.
- Activiti is a lightweight, scalable, and yet easy to use tool but compared to the other options in the scope, it has limited features.
- Bonita is another user-friendly drag and drop tool with customizable features, but it has limited community support and documentation.
- Flowable is also scalable, easy to use and flexible tool, but it has limited capabilities compared to the other tools in this comparison.

- Joget is a drag and drop tool like Bonita. It is user-friendly and customizable but on the other hand, it has limited features.

Camunda is the recommended tool because of its highly customizable, scalable, and flexible features. There is a large and active community that provides support and documentation to overcome the steep learning curve and technical expertise.

4. Practical Part

In the practical part of the work, the knowledge gained from the literature review will be used in analysing the current situation of the selected company and improving its business process by using the business process modelling notation (BPMN). This modelling notion will facilitate visualization that leads to more efficient improvements.

4.1 Description Of the Company

For the practical part, a data-driven solution provider technology company has been selected. The company will be referred to as SNBN S.R.O.

4.1.1 Company Information

SNBN S.R.O. was founded in late 2016 with the main vision of applying advanced mathematics as a basis for developing a data-driven web application solution for mainly retail businesses.

With the solution they provide, they aim to increase the efficiency of the major process by providing fast, accurate, and comparable scenarios based on user selection.

During their journey, they managed to partner up with world-class experts, and leading figures in the sector.

4.1.2 Reasons For Choosing the Company

SNBN is a rapidly expanding company. Owners and top management are aware and open-minded about the process improvement. Employees are willing to cooperate to implement the suggested improvements.

Alongside SNBN's willingness, their business correlates with the author's education and experience. Therefore, the limitation points can be understood deeply and effectively improved.

The aim of this thesis is to use BPMN to have a comprehensive understanding of the business processes of the company and optimise the process to increase effectiveness while unifying all the models used by different teams in one schema.

4.1.3 Organizational Structure

SNBN S.R.O. is a relatively small tech startup with approximately 40 people from different nationalities working under one roof to advertise, implement, support, and develop the solution. Whereas most of the employees work in one office with a defined home office allowance, the sales team is working fully remote from different parts of the world.

In addition to the regular responsibilities, the CEO is also directly working with the administrative department, as well as the sales and marketing department. For product and technical details, he is receiving information from other shareholders CTO, and Product Manager while sharing news from other operations.

Company organisation is divided into 6 departments:

- Administrative Department
- Sales and Marketing Department
- Project Delivery Department
- Customer Success Department
- Development Department
- Innovation Department

While each unit may have its unique objectives, they all come together to serve a singular, overarching purpose: to ensure the satisfaction and happiness of valued customers.

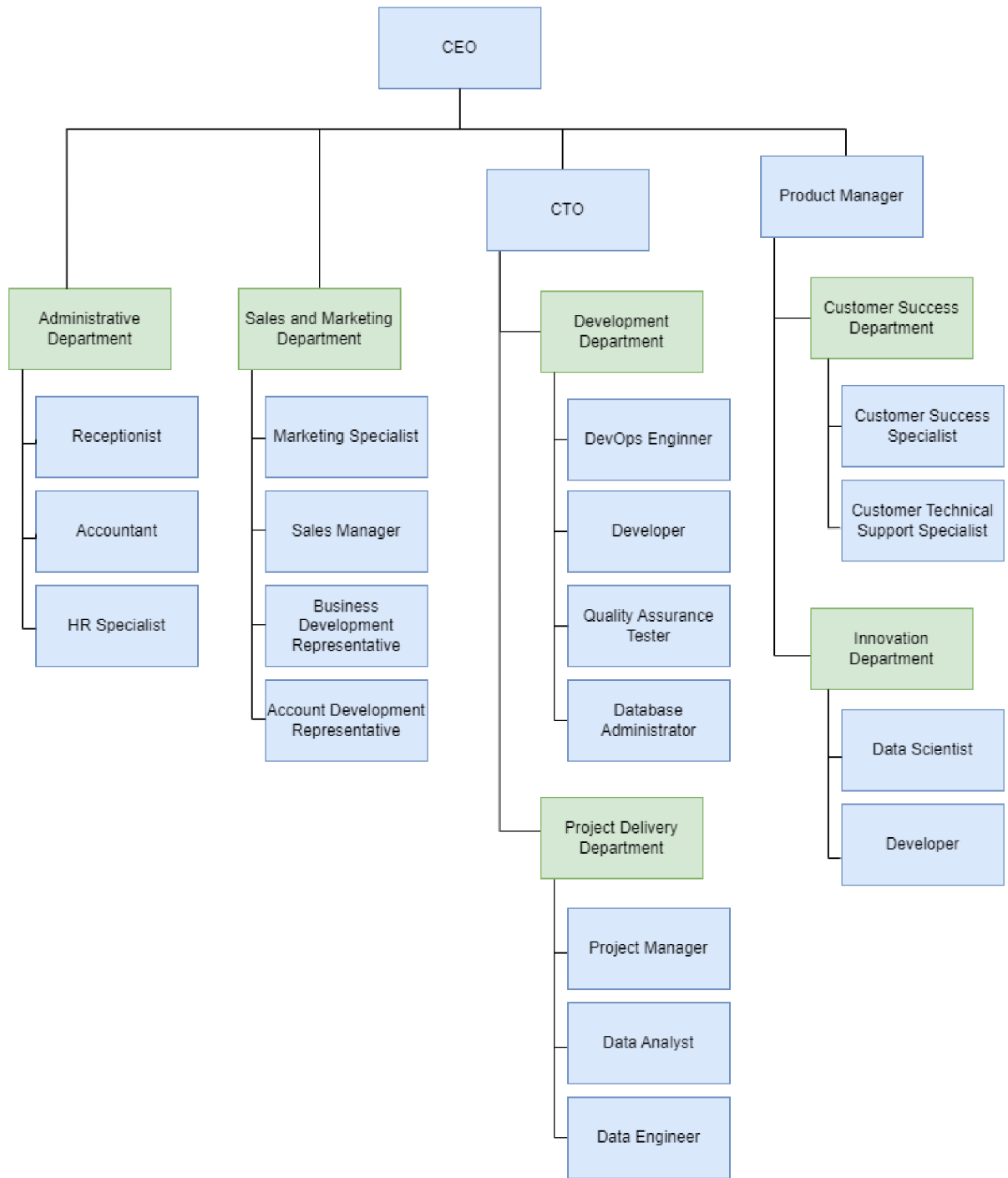


Figure 15- SNBN SRO, Organizational Chart. Source: Author

4.1.4 Administrative Department

The administrative department is focused on operational activities that will increase the efficiency of the company.

This department includes:

- A receptionist who mostly focuses on receiving and sending emails, managing office and kitchen supplies, arranging office maintenance, planning events, and greeting & serving the guests if there are any.
- A sales manager who is focused on the performance of sales representatives according to the company's sales strategy.
- Business Development Representatives, who are the first point of contact of the right audience. They analyse the market and directly reach out to the right audience to discuss the business details.
- Account Development Representatives, whose focus area is managing the deals alongside maintaining customers' additional requests.

4.1.5 Sales and Marketing Department

Main goal of this department is to win customer deals. Their journey starts with reaching the right audience, introducing the product, prepare and sign the deals.

To reach that goal, sales department has below experts:

- Marketing specialist's responsibilities are creating a marketing plan, selecting the right platform as well as improving the company language. They make sure all the teams are aware and using the company language in customer interactions, including the web site.
- Sales manager is focused on sales representatives' performance according to the company's sales strategy.
- Business Development Representatives are the first point of contact of right audience. They analyse the market and directly reach out to right audience to discuss the business details.

- Account Development Representatives' focus area is managing the deals alongside maintaining customers' additional requests.

4.1.6 Development Department

The development department is not only responsible for continuous improvement and development of the product itself but also responsible for the technical improvements for project implementation.

Experts in this department are:

- A DevOps Engineer, who is responsible for managing development operations.
- Developers, whose responsibilities are making sure the application is up and running smoothly, as well as improving the application.
- A Quality Assurance Tester, responsible for before and after release testing and testing of reported bugs.
- A Database administrator, whose responsibility is optimizing and improving the database.
- A Scrum master, who plans and ensures the scrum framework is followed.
- Scrum master is planning and ensuring the scrum framework is followed.

4.1.7 Project Delivery Department

This is the first team that customers meet after a successful sale. This team plans and smoothly implements customers' data into the application.

It includes:

- A project manager, who plans and tracks the process of the implementation.
- Data analysts, who are responsible for data quality checks and automatizing data import.
- Data engineers, who are responsible for optimizing the import process and aligning the import process based on new product features.

4.1.8 Customer Success Department

After the implementation of the data, it is the responsibility of the customer success department to take care of customers. They continuously align with customers to understand their satisfaction, assist them with application usage, and support them if there is an issue.

Potentially, this effort extends the subscription of the customer with the team of:

- A Customer Success Specialist, who plans customer meetings, assists them with usage, collects requests, and informs customers about upcoming application features.
- A Customer Success Specialist, who plans customer meetings, assists them with usage, collects requests, and informs customers about upcoming application features.

4.1.9 Innovation Department

The Innovation Department is the core team that not only aligns the application with the market demand but also carries the application up and beyond.

This department includes:

- Data Scientists, who are analysing market and customer data to improve application effectiveness.
- Developers, who are responsible for implementing these changes.

4.2 Analysing The Company Business Processes

To create a business process model, company business processes should be defined first. The application SNBN provides is a complex and significant solution for the market. Furthermore, SNBN has separate tools to track different departments. The Sales and Marketing Department is working with flowcharts, the Project Delivery team is using Gant charts to track the project, developers are using the Scrum method and the

Customer Success Department is using task management tools to record the progress. To define and unify the business process, a meeting with the shareholders and team leaders was held. During the discussion, two main processes were found as focus points: customer lifecycle and the application development cycle.

Customer lifecycle starts from marketing targeting and flows through sales, project implementation to the customer success department. Each customer has the same journey with slight differences during the marketing processes. This is an ideal opportunity to further understand and analyse the journey of a customer, therefore, the journey of the data between multiple departments during its own life.

Application development workflow is focused on improving the application. It is a separate cycle from the customer journey but cannot be considered without it. Customers' expectations, requests, and demands are key factors as well as the market demand and development tools' abilities.

4.2.1 Customer Lifecycle Workflow

The first interaction with a potential customer which is called "lead" is done indirectly by a marketing specialist and/ or directly by a business development representative (BDR). BDRs introduce the application to the lead and learn about the lead's expectations and needs. This information will be the base of all sales processes.

This step is followed by lead meeting with an account development representative (ADR) if a mutual interest occurs. During this process, expectations and requirements are defined for offer and project implementation. This process is successfully finalised by signing the offer. Although it is hard to estimate how long pre-sales and sales process vary per lead, the historical sales data shows that it is approximately 3-5 months on average.

After the offer is signed, the lead becomes a customer project. This is announced in the project kick-off meeting, where the project manager introduces the team and presents the implementation process and milestones. Already by this meeting,

customer project team members are expected to analyse the requirements and have a clear understanding of what and how to share the requested information. Although it is not so frequent, a customer's project team may not agree with the timeline and processes. This requires further discussion and alignment from both sides.

During the project implementation, quality assurance applied to the project's sample data to confirm whether it is as requested or not before importing the actual data to the application. Data analysts may ask for further explanations from the project team if there are any unexpected values. After agreeing on the terms, the data analyst will work on the integration of the real data.

Immediately upon successful data integration, automation and set up, the customer project team can use the application. The project team takes hyper care of any question or issue from users following 2 weeks to provide smooth and stabilised usage. Including the data integration, the customer spends 4-5 months in project implementation.

When the project is delivered, the customer success department takes care of their requests and queries. To ensure customer satisfaction, customer success specialists schedule calls to align with customers and the customer technical support team takes care of any technical issue. Customers can ask for upgrades, development of new modules, new implementations, or cancelations during this process. The customer success specialist is responsible for supporting customer with their requests, understand the reason behind and immediately informing related team(s) to collaborate.

Customer lifecycle ends when they cannot or do not want to collaborate with the SNBN S.R.O. anymore. In that case, collaboration stops as agreed on the sales offer.

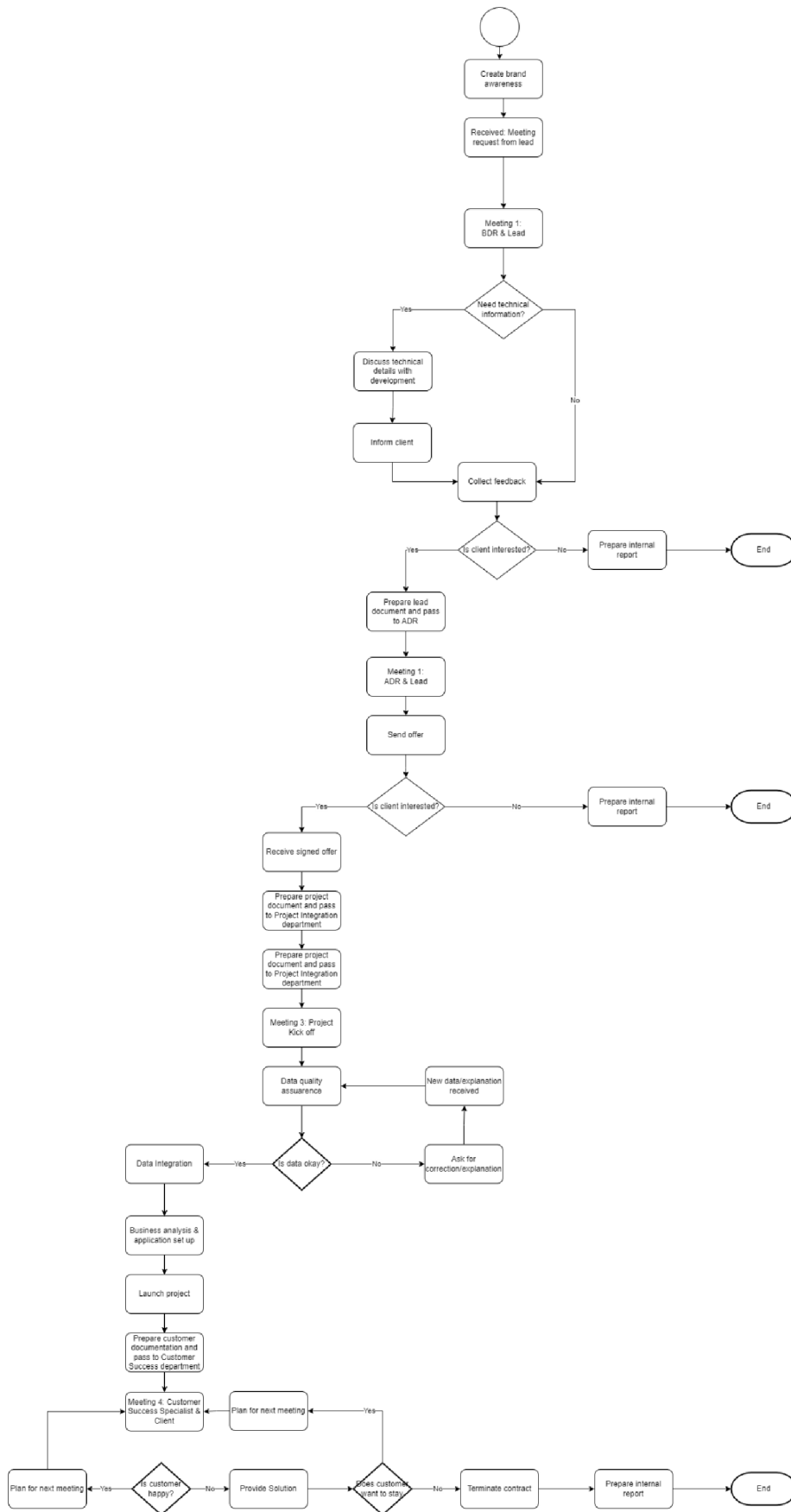


Figure 16 - SNBN Customer Lifecycle Workflow. Source: Author

4.2.2 Development Workflow

Development processes include development and innovation departments. The innovation department is focused on investigating the field SNBN serves, refining data models proactively and developing new features. The focus of development team is implementing these new features seamlessly and continuously improving the application's performance including bug fixes.

Development process starts with analysing the application data to understand what to focus on next sprint. Customer feedback is one of the useful inputs alongside the collected application usage data.

This list is enriched with the requirements of the global innovations that application should meet. Customers' feature requests are studied in this step to determine if this request is aligned with the application purpose, followed by a development plan if it is applicable.

When the requirements are clear, development tasks are created and prioritized. The tasks which require development time longer than one scrum sprint are divided into smaller steps. The remaining tasks will be added to the backlog and reviewed in the next planning.

By management decision development business processes are excluded from optimization.

4.2.3 Business Processes in Customer Lifecycle

The customer lifecycle workflow is analysed by token approach. The object in this workflow is the customer. The customer has three names during its lifecycle: Lead, Customer Project, and Customer. That knowledge assists us in defining three business processes in the customer lifecycle which are also visible in the department names.

Customer life cycle starts lead generation business processes which include pre-sales and sales activities in the company. In this process, the output is creating as many qualified leads that are ready to implement the project as possible.

Project implementation follows lead generation. After a lead signs the agreement, it is in full responsibility of project delivery team. The main aim of this process is to implement customer data into the application seamlessly and set up the application based on customer's requirements and requests.

When a project is delivered, the customer success management business process starts. In this process, the aim is to keep customer satisfaction high by being responsive, providing accurate and quick information and assisting with technical problems in a timely manner.

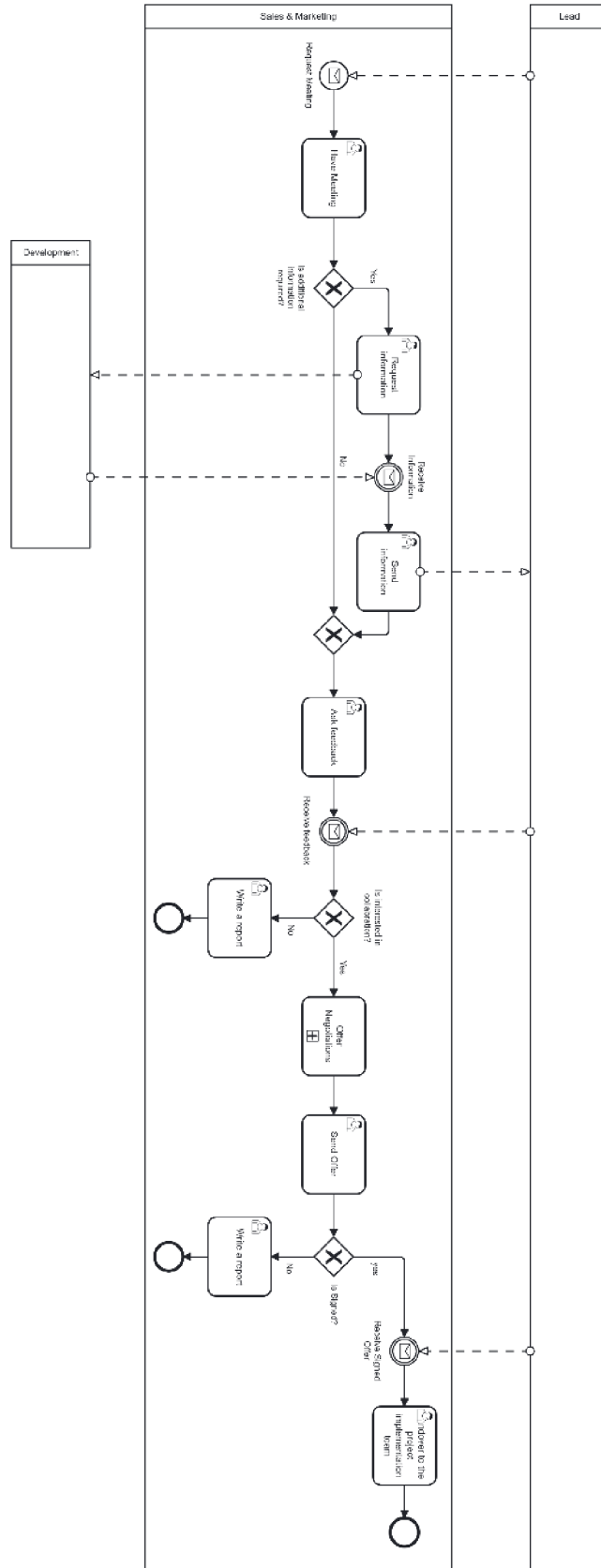


Figure 17- SNBN Lead Generation Business Process. Source: Author

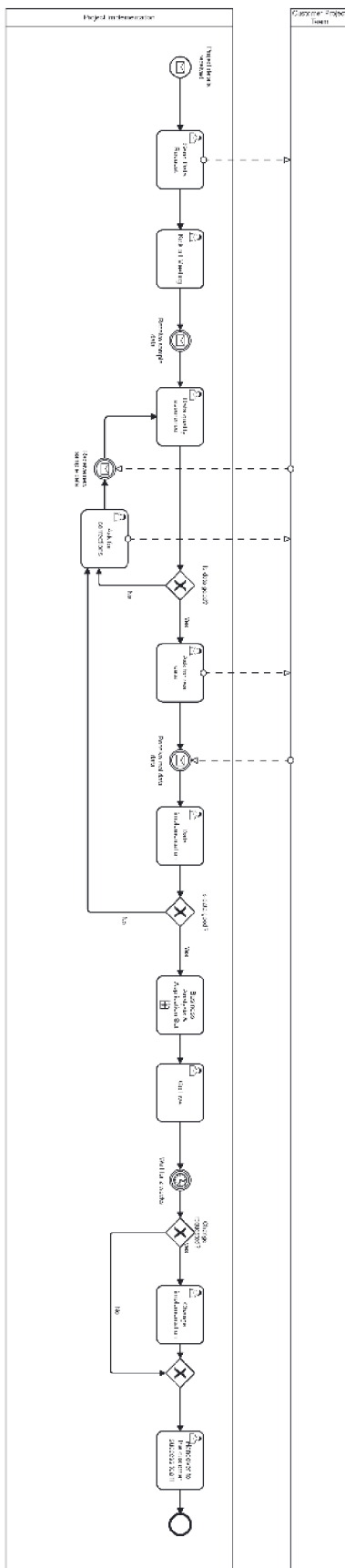


Figure 18 - SNBN Project Implementation Business Process. Source: Author

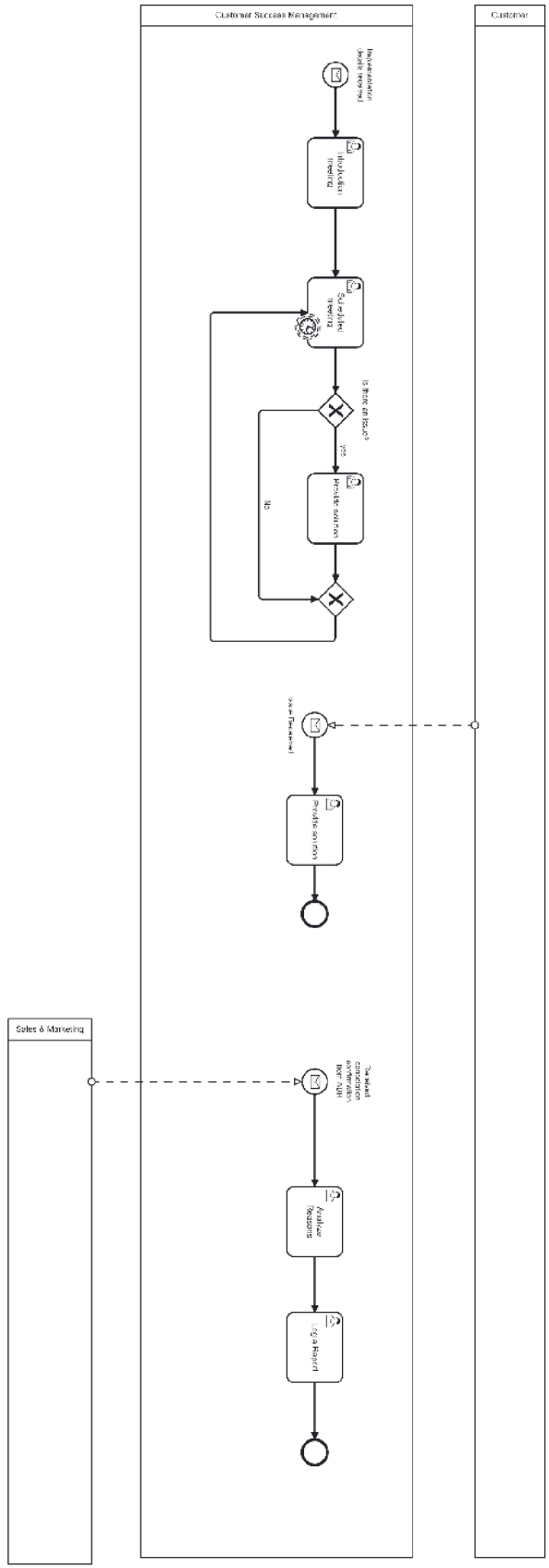


Figure 1919 - SNBN Customer Success Management Business Process. Source: Author

4.3 Understanding the Bottlenecks of Business Processes

Each delay in its business processes is leading to financial and prestige loss for its customers as well as SNBN. Therefore, understanding the difficulties in the process and optimizing them are crucial. Although changing process order may improve time efficiency in project delivery, further investigation is needed to understand the bigger picture.

All departments were asked to write down the issues which they faced within the last 2 years. Then, issues were numbered by the negative effect they had. This helped to understand which issue occurred in which step and the frequency.

4.3.1 Lead Generation Business Process Bottlenecks

Marketing and Sales Department facing mainly application and technical knowledge gap-related issues. Although they have a brief idea about what the application does, they are having a hard time replying to potential customer questions or promoting relevant features of the application. Due to this, time, or customer, frequently both, may be lost.

In addition to that, during the offer process, they cannot discuss technical requirements with customers properly. Frequently in these cases, customers can have false impressions and expectations, correlating with dissatisfaction.

Moreover, the majority of the pre-sales and sales team are working from different countries. Finding the right technical person to receive an answer requires consuming so much time and energy. Frequently they cannot find one in a timely manner.

4.3.2 Project Implementation Business Process Bottlenecks

Project delivery may have troubles times to meet the false expectations of the customers not only because the customer is not enlightened, but also sales team has failed record each topic discussed with the customer. These missed points can lead to delivery delay, or more, cancelation of the contract.

Furthermore, in the current state of the project implementation steps are not ordered efficiently. This duplicates some time-consuming implementations. If there is any error occurring after the data sample check, it will be only visible in the application. When it is found, the raw data should be fixed and reimported.

The data request is clearly defined in SNBN data implementation. Unfortunately, customers have hard time applying required changes on their side. This increased the workload of the data analyst and extend the time spent on the data quality assurance and implementation.

Moreover, during data quality assurance, some of the implementation scripts are prepared. Then later in implementation step, they are redone again. This is a duplicate task, the scripts can be prepared one time and then, review when necessary.

The other misplaced step is customer business analysis. This analysis is done by a business expert during the application setup process which all data is imported to the application, and all automation and tests are finalised. When they uncover a new requirement or correction, the project can be started from the very beginning.

When Business Analysis and Application set up process is analysed in detail, it can be seen the last step is scheduling the automated data implementation. All the implementations work the data analyst has done until this point, will be scheduled as pre-agreed with the client. The schedule can be updated anytime with low amount of effort.

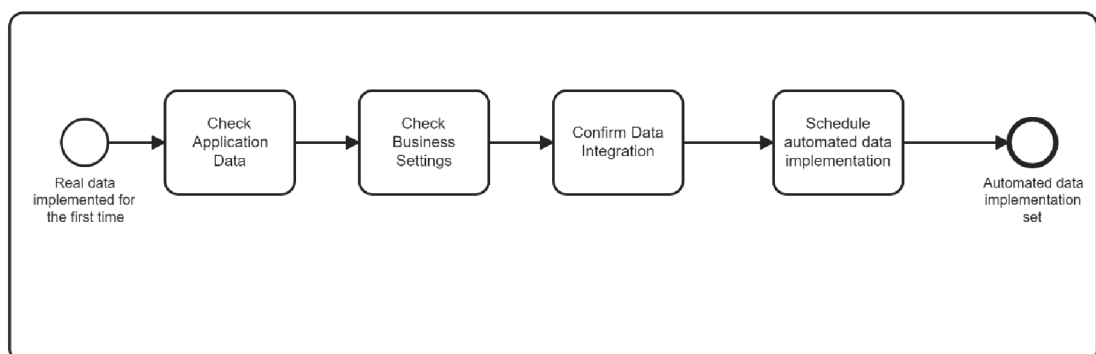


Figure 20 - SNBN Business Analysis and Application Setup Subprocess. Source: Author

All the implementation processes are not discussed here in detail. The main points that need attention in data implementation (and later, automated data implementation) are:

- Notifying customer when there is an issue during implementation proactively: Some of the issues are caused by the application itself. These issues should be controlled by a technical person. Customer are informed for the issues, missing data, duplicate rows and not expected values in the data. This creates a huge workload, especially on client technical support. All issues should be reviewed constantly to decide if client should be informed or not.
- Working with dates: Each country has different date format. Due to this reason, each customer can have special way to work with dates.
- Summertime/Wintertime settings: Data implementation scheduler can't differentiate between summer and wintertime. Each time, the hours are changed, all schedules should be updated manually.

Additionally, the lack of customers' indifferent attitude to the application setup process often causes re-implementation in its later journey.

4.3.3 Customer Success Management Business Process Bottlenecks

Customer success specialists may have a hard time to proving that business decisions are pre-aligned with customers. The blueprint they receive from the project team is technical and complicated to directly be shared with customers. These documents are often complex and time-consuming to find relevant information. Time is so crucial in customer satisfaction and dominates customers over the company.

Even though the blueprint is created for the customer technical support, they use the documentation within the implementation code, which is the exact duplicate of the blueprint, minus the business decisions. The main time-consuming, recurrent task in support is overwriting the implementation code, after customer realised what they confirmed during implementation is not actually what they expected.

As mentioned in the Project Implementation Process, customer technical support specialists are also taking care of notifying customer when there is a customer related

issue during data implementation. Reviewing the development logs and identifying whether the issue belongs to SNBN, or customer is a tiring and time-consuming job.

Furthermore, multiple common main questions found during the exercise of frequently served issues with customer technical support. These questions can be grouped as below:

- A customer wants to change a setting in the application but does not know how.
- A customer cannot understand what a specific field means.
- A customer wants to cancel a report.
- A customer wants to create a custom report.
- A customer wants to add another user.
- A customer wants to change a user's access level.
- A customer finds a mistake in the data in the application.

Between answering the questions and identifying the issues, customer technical support specialist has limited amount of time to focus on high value tasks.

4.4 Process Optimizations

The main problem in SNSBN's business processes is about data inputs and outputs, as known as documents. These documents either not suitable for consumer or do not contain enough information for operations to run smoothly.

As a result, communication between departments and with customers is affected negatively. Documenting the optimization process, may increase the customer satisfaction and smooth the stakeholder changes during the process.

The other important issues are the manual jobs that can be automated. These manual jobs require most of the working hours of data analysts and customer technical support specialists, increasing accommodating costs.

In Customer lifecycle process optimization, optimization focus is on prevent conflicts, decrease re-dos and as a result decrease time spent on a task and increase success rate.

4.4.1 Lead Generation Business Process

In the pre-sales process, business development representative (BDR) meetings with customers are reorganized and an additional document added. After the first introduction meeting with potential customer, a questionnaire will be asked to be filled by potential customer. Later this questionnaire will be analysed and become a baseline for future sales and application set up discussions.

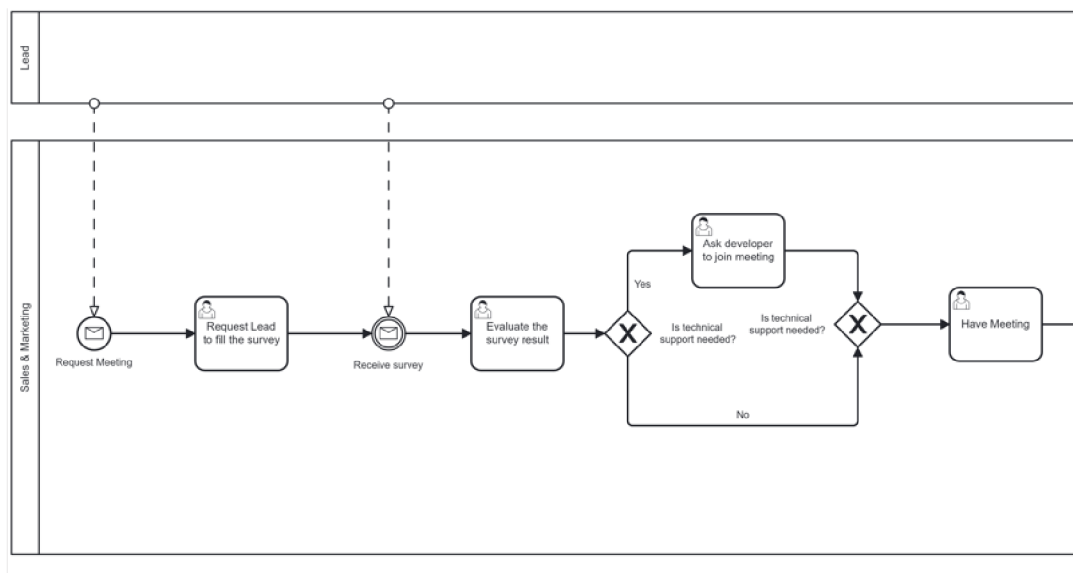


Figure 21 - SNBN Lead Generation New Business Process Pt.1. Source: Author

A BDR can decide if they need a support about product, they can invite the coworker who is assigned to this task, before planning a demo meeting. This will improve time efficiency by answering potential customer's how and why questions in one meeting without looping around in later steps.

Account development representatives (ADR) will use the analysis of the questionnaire to prepare their offer. Before finalizing the offer, a technical requirement meeting should be held rather than sharing only a technical requirement documentation. In this technical meeting, the customer will be pushed to apply the technical requirements as

they are. CTO and ADR will discuss potential penalties to be demanded from customers if the required changes should be done by SNBN employees. Conclusions should be written in the final agreement to prevent further conflicts.

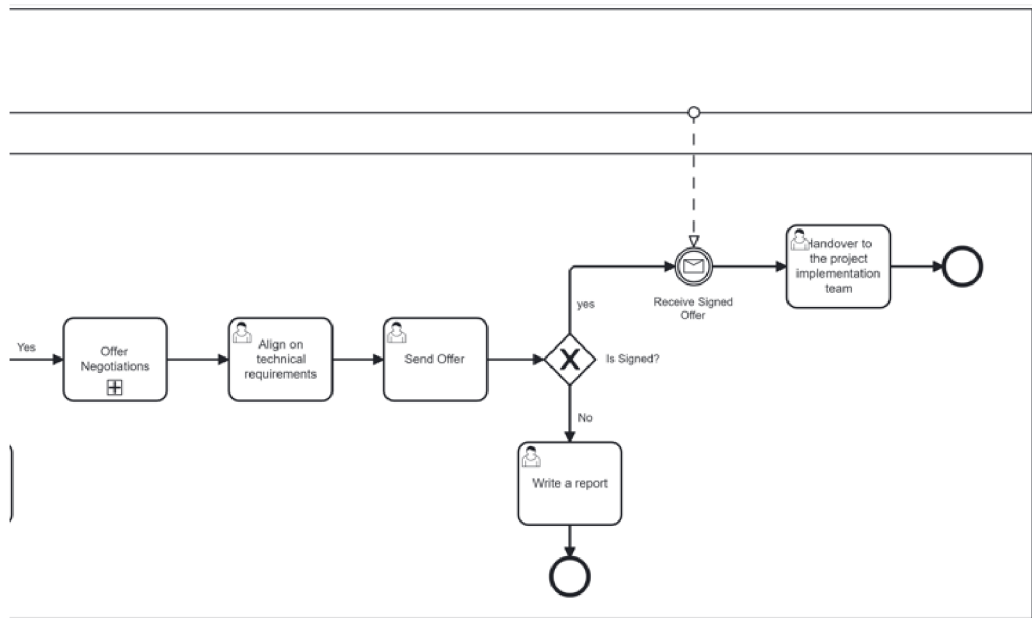


Figure 22 - SNBN Lead Generation New Business Process Pt:2. Source: Author

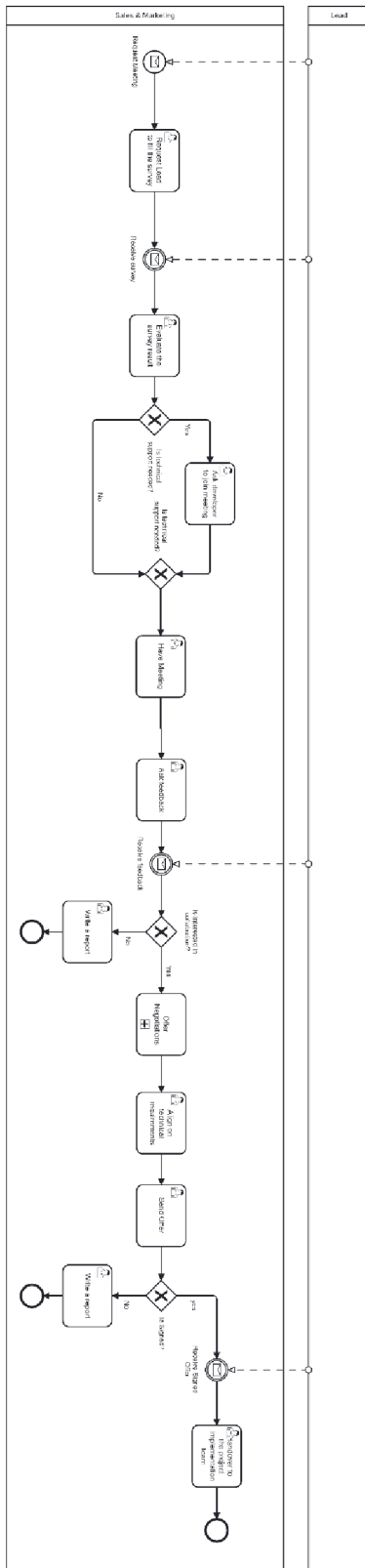


Figure 23 - SNBN Lead Generation New Business Process All. Source: Author

4.4.2 Project Implementation Business Process

In aim to eliminate re-implementations, business analysis that is done during application set up process will start during early integration to support data analyst during data quality assurance and implementation process. It will end with setup process when data is implemented, and application is set up according to customer expectations.

Furthermore, the time received from eliminating re-implementations will be added to the hyper care period. Also, customers will be pushed to engage with application as soon as possible. With this approach, customers will have more time to evaluate and request a change early enough to decrease the workload in technical support.

Moreover, manual tasks can be automated by developing tools and features. Development process will require time and effort. In the long term, it will provide fast, accurate and effective process.

First requirement is to have a data quality assurance tool that can analyse the real data based on technical requirements of SNBN without implementing big data to the application. This tool can be also used in sample data assurance to quicken the process. There is an opportunity that customers can upload their data to a web tool to get the quality score of their data with examples in the future.

With automated version data quality assurance will run twice. It is important to work with sample data because customers can prepare these data scripts faster and if there is an issue, it will be quicker to respond and update. If this quality assurance applies only to real data, then data analysts will wait to long for real data to be available and even longer to be fixed and resend.

Second manual task that will be implemented is to send customers project teams an email about customer related issues. For this purpose, an email feature will be developed and used in implementation process to send the information about:

- When the data is older than agreed time frame.

- When the data is smaller than agreed size
- When there are duplicate rows in the data set, and the samples.
- When there is an unexpected rule and the samples.

It will be possible to set up an email to a group of recipients, preferably the customer project team, to receive an email about the issue and samples. This will decrease the workload of data analysts and mostly customer technical support specialists.

The other important update in project implementation is updating the documents. Project implementation documents play critical role in the implementation and customer success management. The context of blueprint documentation will be updated based on customer success specialist requests. It is decided to include implementation related business decisions in the “readme” documentation of the implementation for technical support specialist in aim to increase their knowledge of why data is implemented in that specific way.

Lastly, a new document will be introduced to the process. This document will contain historical data quality checks in the customer data with examples and dates. This way, the approximate time spend on individual issues can be immediately calculated and furthermore, the repeated issues can be detected. Another long impact of this document will be to provide a data input for development processes. If an issue is repeated multiple times in different projects, that might require developing a solution within the application or implementation process.

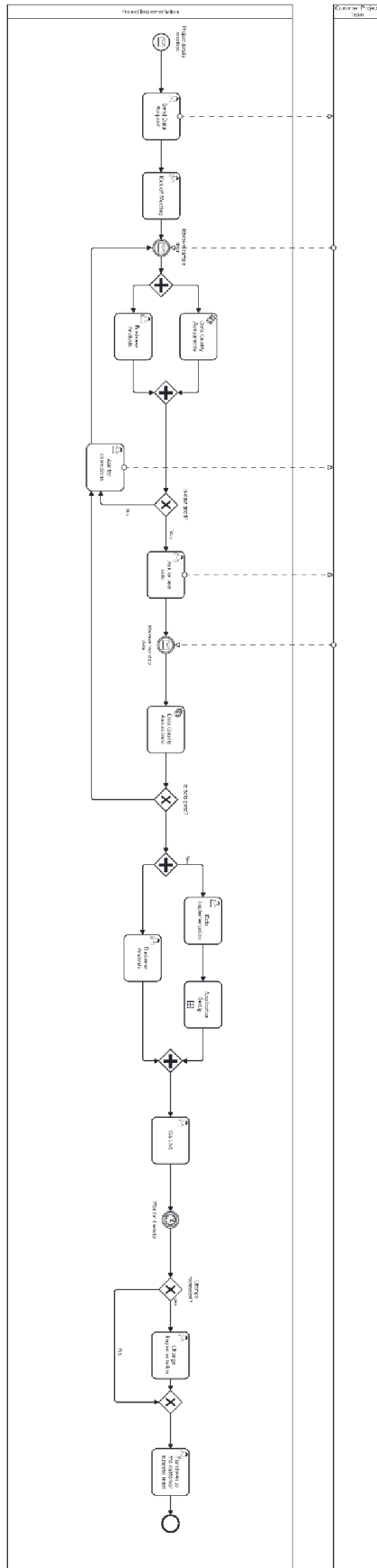


Figure 24 - SBNB Project Implementation New Business Process All. Source: Author

4.4.3 Customer Success Management Business Process

The format of blueprint document that project delivery department prepares will be changed. It will include the relevant information from final agreement, with promised or possible enhancement points that are discussed with the customer.

Moreover, it will include the business requirements as well as integration details summarised as non-technical people can understand and follow-up. This document will be referred and maintained by customer success team later and shared with customer.

Additional to the documentation of the application, it will be a great value to add a frequently asked questions (FAQ) web page with pictures and encourage the customers to visit that website before contacting support team. This will decrease the repetitive, time consuming queries from support workload. They will be also available to share this website with customer when they directly reach out to support with one of the FAQ.

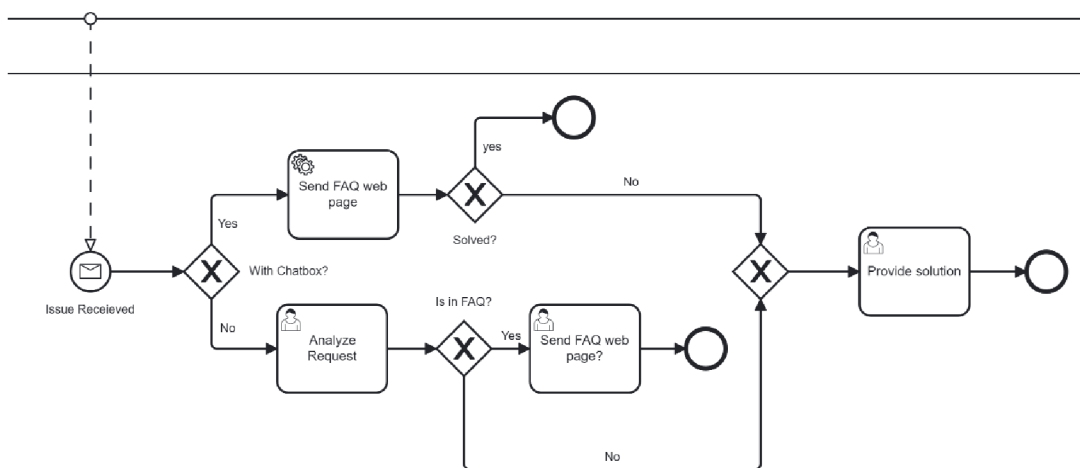


Figure 25 - SNBN Customer Success Management FAQs Business Process. Source: Author

In current situation, only a technical support person or a data analyst can cancel a report. The risk of sharing this responsibility with client is assessed. If customer cancels a report accidentally, a technical person can reverse cancelling action or create a new report with one click. Compared to the cancellation requests customer support gets, this reversing job takes zero time. This feature is requested from development team.

Unfortunately, tool is not designed for a customer to fix a data mistake. There are multiple steps from the time customer export the data and share to import the data, manipulate, and implement. Each error in the data is require a deep analyse to find the core reason and fix by a technical team.

Custom reports are custom features in the application and there are some limitations for usages. It is not aligned with the goal of the application. That requests will be handled by a customer support or a data analyst, depending on the complexity of the task.

5. Results and Discussion

5.1 Implementation

The final BPMN schemas are presented to the management and discusses feasibility of application. It is decided to start with the updates in project delivery part of the customer lifecycle, which will shape the updates in sales and marketing and customer success departments.

5.1.1 Lead Generation Business Process Implementation

A meeting held with all departments to finalize the lead assessment questionnaire. Business development representatives (BDRs) presented frequently seen lead stories. This followed by the information from account development representatives (ADRs), about what effects the pricing. Data analysts and customer success specialists shared when they have conflicts with customers and the undefined metrics that caused the issues. Development and innovation teams presented what was in upcoming development plan and in which cases they need to be strictly informed before confirming with leads and customers.

The customer offer template was updated. The new important fields were discovered during CustomerNew project implementation. CustomerNew was the first customer had the new project implementation phase. It was discovered that during the sales process, multiple implementation critical points are only discussed verbally and there was no written agreement or only mentioned in emails but not recorded in any official documentation. This implementation will be detailly explained in next chapter.

At the end of the meeting, it was concluded that product manager will attend the pre-sales technical meeting if a BDR decides there is a need. CTO will attend technical requirement meetings that will be held before finalizing the deal to explain requirements comprehensively.

5.1.2 Project Implementation Business Process Implementation

A new customer who was just starting in their delivery journey was selected for this implementation. This customer will be called “CustomerNew”.

Product manager and data analysts asked information from sales team and business analyst for data implementation.

Business analyst decided to contact with customer in early stages to profoundly understand their needs. With early gained knowledge, she aimed to guide data analyst better during implementation.

Multiple critical information was missing from the documentation ADR shared. Immediately these were requested from customer and ADR is asked to add these fields to customer agreement template.

There was a conflict about how data requested and how it will be provided. CTO was informed about this decision and data request form is updated to clearly specify how data should be provided.

After kicking off the project and sample data shared. Data analyst checked the quality of data. This analysis was also shared with business analyst. Business analyst’s review decreased the time of determining the quality. She grasped the customer data better and prepared more on-point questions to customer that changed the planned implementation before it was done. That eliminated the double work on 3 of 8 data endpoints.

Unfortunately, the real data has some issues that was only detected after implementing all the data. In CustomerNew’s case, this data was very small and only delayed the process by 2 hours. Real data evaluation was not possible to be done before implementing with current tech stack. CTO was informed about this situation.

After the final data checks application was smoothly set up and CustomerNew became a hyper care customer 25% faster than planned. That provided customer more time to

interact with the application with immediate support and ability to change implementation. CustomerNew chose to change only 1 calculation. CustomerNew was successfully handed over to customer success team on time.

In meantime, development of data quality assurance tool has started. Although, it was possible to check data quality before implementing real data to the application, data analysts need to prepare two different implementation scripts for the real data implementation and data quality assurance step. This status is not optimising the current project implementation process.

Alongside with data quality assurance tool, email notification feature has been developed and successfully launched in below situations:

- When the data is older than agreed time frame.
- When the data is smaller than agreed size
- When there are duplicate rows in the data set, and the samples.
- When there is an unexpected rule and the samples.

5.1.3 Customer Success Management Business Process Implementations

During the implementation of CustomerNew, a meeting held with customer success specialist about blueprints. A customer had major issues about remembering the discussion both in online meetings and emails. This customer will be called “CustomerOld”. Unfortunately, there were a lot of conflicts, and the response time of customer success specialist was not enough to prove because the files she could use either too technical or too distributed. CustomerOld was a perfect candidate for new blueprint documentation.

The information delivery team requested for implementation was used as base of this document. It was enriched with specialised implementation details in business language and how and why application is set up.

The information in new blueprint was shared with CustomerOld and their behaviour was tracked. Whenever CustomerOld shared an issue, customer success specialist first referred to the blueprint. Additionally, the issues and how to solve them added to blueprint alongside with potential upgrades that were discusses.

The new blueprint didn't have significant decrease in CustomerOld's queries, but it decreased average first response time of customer success team from 120 minutes to 15 minutes. They were able to identify if this issue was already mentioned or not, if solved and how. If the answer was not documented in blueprint, they immediately assured CustomerOld that it was being taken care of and started working on the query.

The automated tasks decreased the workload of customer technical support specialists. FAQs web page decreased the repetitive, time-consuming tasks. Customer behaviour analysed through the chat box and 68% of customers were content with the FAQs page and did not contact further.

The email notification system helped customer technical support specialists to filter out customer origin issues and let them prioritize major tasks during their working schedule.

5.2 Evaluation

The processes were updated and closely inspected for next eight months. Results are constantly evaluated every 5 weeks.

5.2.1 Time efficiency

One of the main benefits that SNBN S.R.O. gained was time efficiency.

With controlled customer data flow between departments, waiting time of coworker to respond and time spent in unnecessary meetings is minimized. The average time customer success team spend to first response a customer query is decreased from 120 minutes to 20 minutes. Business developer representatives do not spend 4-6 hours to find a colleague to respond their technical questions. Need for an early technical discussion can be detected and meeting can be proactively arranged.

The duplicate documentations are updated or removed. The current documents have been updated based on the needs. Therefore, there is no time spend on not needed documents.

Furthermore, with two technical meetings added to the customer life cycle during pre-sales and sales process, alongside with the new information documented in the customer agreements helped to prevent future conflicts. During evaluation, 3 of 5 potential customer conflict has been eliminated.

Although data quality assurance tool is still in development and is not providing major time efficiency currently, decreasing other repetitive tasks, employees had more time to develop better and optimised solutions for customers. Data analysts have time to optimize their codes. Customer technical support specialist can use their time more effectively.

5.2.2 Impact on Customer Satisfaction

Customer conflicts about false promises and competitive deadlines is decreased. All deadlines and feature promises are discussed with development first then shared with customer. This is solving sales process by 6-10 hours (3% of an average time a customer spends in sales pipeline) but increases the customer satisfaction in the long run.

The repetitive re-implementations in technical support team are minimized. Therefore, their efficiency in issue solving has increased. Prior to process change, issue solving is increased by 30% and issues are open 20% less amount of time.

Additionally, customers can reach automated and fast responses for their queries or issues that happens during scheduled data implementation. That encourages customers to engage with the application better, contact less for minor issues and act on fast about implementation issues.

Development and Innovation departments development processes are only interrupted when there is a major bug. They improved application response time by 30% and launched 1 major and 1 mid-size new features.

5.2.3 Financial Benefit

A non-delayed project delivery increases the income by simply changing the status of the customer from implementation to production. Production customers and implementation customers have different invoices.

Automated tasks unload the work from data analyst and customer technical support specialist which decreases the need for new team members. The cost of finding a new employee and accommodating one has been saved.

Well-timed feature developments are increasing the value of the application and open new business deals opportunities.

Moreover, a satisfied customer is more willing expand the scope of work, either upgrading the subscription or adding additional projects. At the month 6 of the evaluation SNBN needed to increase the pricing which they were successful. By the end of the evaluation, customer success team mentioned that more customers are asking for updates compared to process optimization.

Finally, a satisfied customer has indirect effect on financial status by sharing how satisfied they are with the application, therefore decreasing the marketing cost in long-term. 2 customers that are onboarding during evaluation process brought one additional project with them by sharing their experience with SNBN. That lead to another opportunity for marketing team to use customer stories to attract new customers.

6. Conclusion

The business processes in the customer lifecycle of SNBN S.R.O. has been created, analysed for bottlenecks, optimized, and evaluated in this diploma thesis.

The first part of the thesis is focused on the business process management and the well-known notations that are commonly used. Business Process Model and Notation (BPMN) is the most suitable technic to show complex business processes and how multiple participants interact with each other through them. Available open-source tools are compared and Camunda is selected for its highly customizable, scalable, and flexible features.

In the second practical part, the selected company SNBN S.R.O. had been introduced. Its organizational structure and business field was given. After the brief discussion with the shareholders, the business flows were created. Then, customer lifecycle was selected as a focus area. There were three business processes in this workflow: Lead Generation, Project Implementation and Customer Success Management. Those processes were further analysed with the team members to understand their daily workload and workflow. Based on this analysis, the business processes are created, and bottlenecks are detected. There were many optimization opportunities. It was possible to optimise the process by improving the documentations and automatising the tasks and responses.

The optimised models were able to test on the two customers who started their journey in the project implementation and customer success processes. Their results are compared to the previous projects and customer success management. Then the shareholders analysed the data and decided to continue implementation to other leads, projects, and customers.

After the eight-month evaluation, it can be said that the optimizations improved time efficiency in the company. Now employees spend less time finding the related information and person to discuss the technical topics further. Conflicts in customer lifecycle has decreased, SNBN and customers can have healthier relationships now.

Decreasing of the conflicts and increasing the efficiency decreased the cost of employment and promise increase in income.

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Available at: <https://solutionsreview.com/business-process-management/the-top-free-and-open-source-bpm-software/>

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7.2 List of abbreviations

ADR- Account Development Representative

BDR- Business Development Representative

BPM- Business Process Management

BPMN- Business Process Model and Notation

CEO- Chief Executive Officer

CTO- Chief Technology Officer

FAQ- Frequently Asked Questions

KPI- Key Performance Indicator

UML- Unified Modelling Language