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Building A Knowledge-Based Chatbot for Customer Support

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The objective of this study is to transform the current simplified version of chatbot into a smart AI chatbot that can help the case company with lead generation and will take it closer to having an automated sales funnel.

The data collection for this study includes interviews and discussions in the case company and a small-scale questionnaire with the customers. The research method for this study is action research as this requires iterative actions that can help the researcher to plan and implement in cycles based on the evaluation done at each cycle.

The study started with the current state analysis that helped to identify the issues that the case company faces within the current chatbot system. The identified issues related to a considerable manual interference, limited availability in terms of the response time, and lack of a knowledge base for more informative responses. Therefore, the focus areas of this study concentrated on improving the current version of the chatbot to implement a knowledge-based feature that can provide relevant answers 24/7 as it can understand the context and intent of the website visitors. To find relevant guidance the study explored available knowledge on the topics of chatbot building and selected especially HubSpot guidance as best practices to follow when develop the solution.

During the proposal stage, the first version of the chatbot that was developed. During the testing stage, it was deployed to the case company's website and is currently in use since then. The validation stage included validation discussions with the key stakeholders in the case company that evaluated the testing results and suggested further improvements. The chatbot that has been launched helps the customer service agents to respond to multiple inquiries, close deals from the leads generated by the chatbot, and pass their information to the CRM system to assist the customer service agents further, when needed.

Keywords	Chatbot, Artificial Intelligence, Natural Language Processing, HubSpot

Contents

Glossary

ORM	Object-relational mapping. The set of rules for mapping objects in a programming language to records in a relational database, and vice versa.
DBMS	Database management system. Software for maintaining, querying and updating data and metadata in a database.
AI	Artificial Intelligence
NLP	Natural Language Processing

1 Introduction

As AI technology is becoming more popular nowadays in digital age, it shows promising capabilities to improve marketing strategies. According to Vishnoi (2021), about 80% of customer inquiries can be resolved by AI chatbots as the questions are mostly repetitive - without the need of customer service representatives. Furthermore, developing an AI-powered chatbot is beneficial for small businesses because it can handle multiple queries which allows you to focus on more complex issues.

A virtual agent is a very powerful tool that can interact with customers and potential leads (Kannan and Bernoff 2019). Chatbot is an automated text chat that provides pre-defined replies according to the customer's request. It merely scans all the information available in the Chatbot knowledge-based library system and based on the client's messages or options selected, it will pull out the best answer from the database swiftly. Compared to a human Customer service agent, chatbot is available 24/7 and can answer customer's questions instantly. This is a type of artificial intelligence that once utilized correctly, will have an impact on the company's integrity and reputation.

This Thesis aims to improve the current chatbot system of the case company´s website existing chatbot. The company is Clean Living Oy that provides cleaning services and other household services to ease the client's daily lives. AI-powered chatbot can significantly impact business operations especially in marketing and sales departments.

1.1 Business Context

The case company of this thesis provides cleaning services and other household chores to ease the client's daily lives. However, the current chatbot implemented on the website is a very simplified version which is supported and created with HubSpot to simulate conversation with potential clients.

The company is a family-owned small enterprise and most of its employees are also involved in a full-time job and cannot monitor the company´s chatbot activity around the clock. Therefore, potential leads through the chatbot are often overlooked due to inability to answer each client's questions and respond immediately. The chatbot system is mainly used to attend customer inquiries that could generate more leads to web-site traffic.

Presently, the company employs 12 full-time cleaners who do their work with commitment and diligence. Two of the co-founders have professional backgrounds in the IT world who see the importance of having presence on the worldwide web as beneficial. The company started by creating a website proving brief information regarding the company´s services and contact information. Furthermore, the company also executes its business marketing through HubSpot where the leads and sales are processed through the marketing platform. The company also advertises our service via social media platforms such as Facebook and Instagram where the company publishes active advertisements to target audiences within the range.

One of the company's goals is to maintain customer satisfaction by providing high-quality service at each service provided. If in any case, a client is not very much satisfied with the outcome, he/she is compensated by providing an additional service until the client's request is fulfilled. However, although the team is not yet substantial, each of the team members has a professional background that contributes to the company's success by far.

1.2 Business Challenge, Objective and Outcome

The company introduced its first chatbot in 2019 year. The current simplified version of the chatbot was created through HubSpot which is integrated with the company´s customer relationship management system. Additionally, HubSpot operates as a sales platform that provides visibility of all activities throughout the buyer's personas journey. So far, the company continues with the same approach in terms of conversion marketing, as it has recognized a lot of benefits from a chatbot implemented in HubSpot. At the same time, the company has encountered quite a lot of issues with this current simplified version of chatbot on its website.

Accordingly, the objective of this thesis is *to improve the current chatbot of the company.* This improvement is planned to be done by developing a virtual agent for customer interactions to gather leads and be attentive at any time to its website users.

Hence, the outcome is a proposal on *how to improve the current chatbot of the company* that will be implemented as far as the thesis timeline allows.

1.3 Thesis Outline

The thesis and the development of the chatbot will give a valuable impact to the sales and marketing of the case company. The company is ready to rip out both the benefits and potential challenges of introducing an AAI-based chatbot. For example, an AI-powered chatbot uses Natural Language Processing (NLP) that extracts user-input texts or human language intelligible to machines. All the translations, keyword extractions and topic classifications by NLP are then processed by Machine Learning to automate responses depending on the chatbot user's intent. Both NLP and Machine Learning are subsets of AI chatbot which identifies and scans the human's intent through the chatbot interaction and provide accurate responses based on the intent. Such benefits and challenges need to be clarified for a SME company, which will become part of the Thesis.

The thesis will start from the current state analysis based on Data collection 1 in Section 3; then it proceeds to exploring literature and best practice on developing and implementing chatbot in Section 4; and based on the results from both, the thesis will propose how the chatbot should be built based on the case company´s needs in Section 5. Finally, in Section 6 the thesis will describe how the chatbot should be implemented in the case company's environment. Since the thesis approach is action research, the implementation part will require several iterations in Section 6. The feedback will be provided by A/B testers against the pilot version, and it will be taken into consideration in the next implementation round.

2 Method and Material

This section describes the research approach, research design, and data collection and analysis methods used in this Thesis. However, the most suitable research approach for this project is Action Research, this section focuses on why this approach is selected.

2.1 Research Approach

Action research helps to address issues through dealing with context-bound knowledge (Andersen and Blichfeldt 2006). The action-based research aims to recognize issues within the organization or operations and as an outcome, to discover the answers and finally find a possible solution to the problem. Additionally, according to Andersen and Blichfeldt (2006), one of the responsibilities of the action researcher is to provide transparent feedbacks or transferrable reports to all other audience/participants involved regarding the findings, activities, procedures, and outcome of the overall study.

Figure 1 below shows how the elements of the Action research cycle are organized.

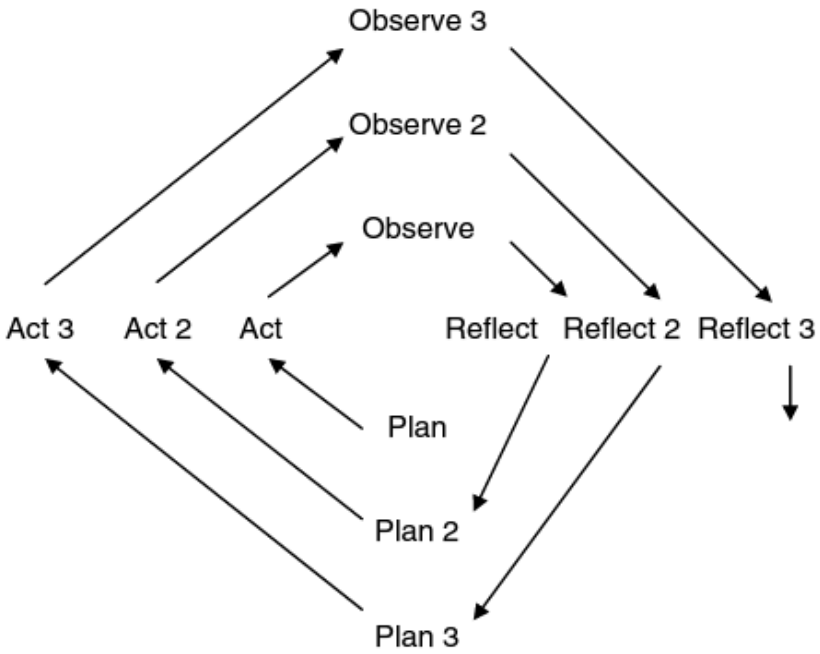


Figure 1. An extended action research model (Costello 2011, 9).

As seen from Figure 1, comparing to other research approaches, action research is an iterative action, so that the researcher can identify if the planned action towards a problem is effective (done through Observe/Reflect), if not, the Plan must be used and executed via Action until the expected outcome is achieved. Through the Action research (AR) cycle, the action researchers will potentially discover a variety of possible solutions as the researcher explores in a pandora box filled with diverse theory and practices. (Coughlan and Coghlan 2002.)

In conjunction to the Action research approach, qualitative research makes the preferred research family. According to Mack et al. (2005), the three most common data collection methods in qualitative research are observation, interviews and focus groups. Observation is used when the researcher/observer needs to observe the behavior of the subject during the process. Observation is also useful if other methods such as surveys or interviews are not successful. On the other hand, a focus group is conducted when the target participants belong in a cultural norm of a group to gather overview concerns from that group. Finally, interviews are a form of data collection where participants are interviewed directly based on their experiences, views, and perspectives. All mentioned data collection methods require active participation of participants as their input is constructive to gain more understanding regarding the issue raised in the research. (Mack et al. 2005, 31.)

Among different types of interviews, an in-depth semi-structured interview is the most common of the data collecting methods. This technique is used to gather data from individuals or groups. Depending on the topic of the interview, the interviewer must select the right set of people who are associated with the phenomenon by firstly asking general questions into more detailed ones. To convert the collected interviews into qualitative material, the interviewer needs to define the questions, record the conducted interview, and take field notes. This involves keeping track of which questions have and have not been asked and answered, knowing how to phrase questions and encourage participants to provide elaborative answers, including being friendly and accommodating in the contexts of the interview. (Mack et al. 2005.)

In this study, the most applicable approach would be Action research, since this study does not only include identifying the issues but also the actual development of the chatbot. The continuous cycle of the Action research would help to identify issues, apply the most applicable action to solve the issue, reflect on the pilot version iterated and

improve them based on the feedback in the validation period. The input of each participant in this research is highly valuable and will be considered to tackle the issues that are faced in conversion marketing. Moreover, the collaboration between the participants and the action researcher is crucial to determine issues in a particular circumstance before proceeding to the study.

In this study, face-to-face interviews will be conducted with the internal stakeholders to acquire a more comprehensive perspective regarding the current implementation of the chatbot in the case company website. Additionally, follow-up interviews will be performed at the final stage of the study to ensure that the issues defined at the early stage were administered and addressed. As the first stage of the Action research is to identify the problem, this would help to specify the requirements and implement them in the chatbot. The interviews are scheduled as face-to-face meetings which concentrate on the issues, they face on the current chatbot system. The questions are pre-defined and depend on the role and responsibility of the respondent. Any field notes collected during the interviews will also be checked with the involved participants, this is to ensure quality of the field notes and this increase reliability.

2.2 Research Design

Figure 1 below shows the research design of this study.

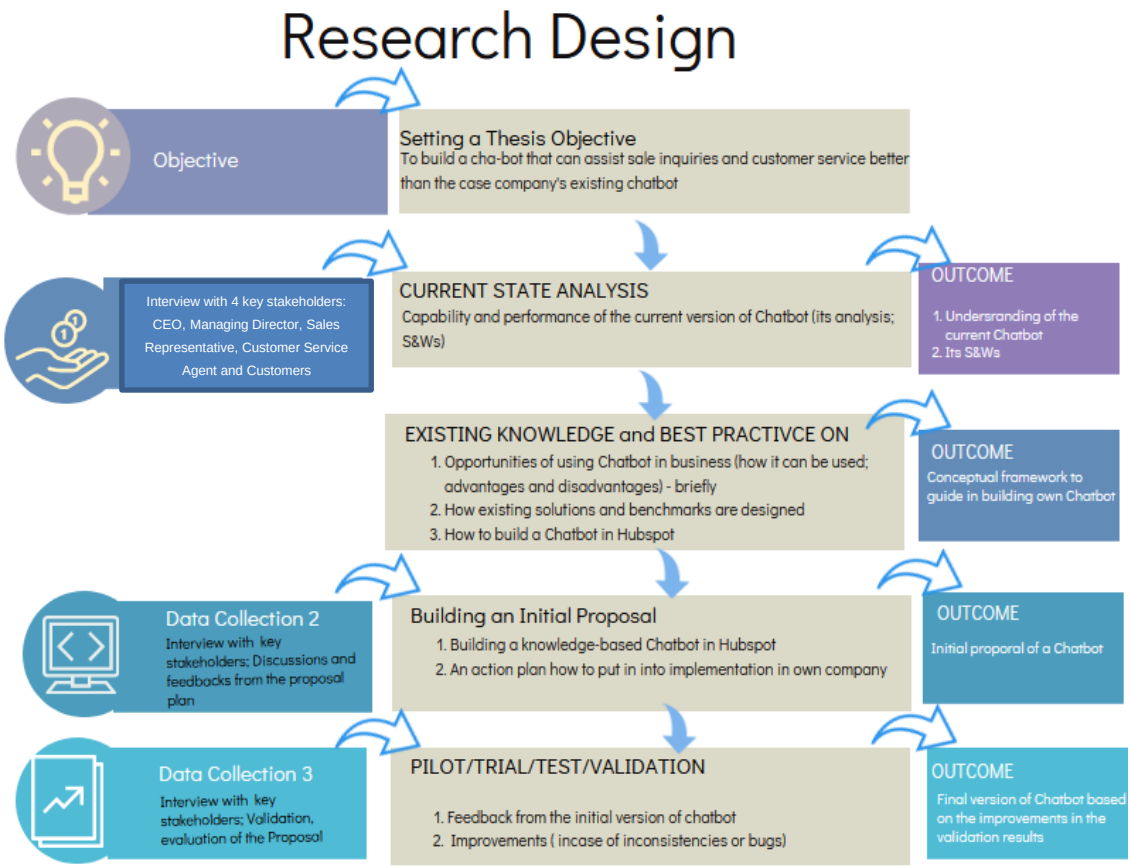


Figure 1. Research design of this Thesis.

As shown in Figure 2, the first step of this study is to recognize the objective, and this is determined by analyzing the case company's business challenges. Next, Data collection 1 helps to gather the understanding of the current simplified version of the chatbot. This will occur by interviewing 4 key stakeholders which include the CEO, Managing Director, Sales Representative and Customer Service Agent of the case company and its customers. The collected data from Data collection 1 helps to identify the issues impacting the current marketing and business operations.

Next, literature review and the conceptual framework of how to build a chatbot will be done. This step will also investigate the advantages and disadvantages of implementing a chatbot but will focus on finding the best practices for developing chatbots.

From the knowledge obtained from literature and best practice and through the current state analysis results, an initial proposal of how to build a chatbot will be developed for the stakeholders. It will be done based on co-creation with the stakeholders and Data collection 2 to identify the desired outcome with the stakeholders.

Next, this initial proposal will be tested and validated, and an action plan will be built on how to implement the proposed chatbot in the case company. It will be done with the help of Data collection 3 used to evaluate the initial proposal (the chatbot build plus the launch of the real chatbot) and suggest further improvements based on the pilot version of the implemented chatbot. The improvements or fixes are done in iterations until the desired outcome is reached.

2.3 Data Collection and Analysis

This study relies on a variety of data sources collected in three data collection rounds. Table 1 shows details of Data collections 1-3 used in this study.

Table 1. Details of Data collections 1-3 used in this study.

	Participants / role	Data type	Topic, description	Date, length	Documented as
	Data 1, for the Current state analysis (Section 3 or 4)				
1	Respondent 1: CEO	Face to face	The case company OI approach and overall sales and marketing process	May 2020, 1 hour	Web-based Survey and Field notes
2	Respondent 2: Managing Director	Face to face Interview	Interview about current process related to the respondent experiences	May 2020, 1 hour	Web-based Survey and Field notes
3	Respondent 3: Sales Representative	Face-to-face Interview	Interview about current process based on the respondent's experiences as a sales representative	May 2020, 1 hour	Survey and Field notes
4	Respondent 4: Customer Service Representation	Face-to-face Interview	Interview about current process based on the respondent's experiences as a sales representative	Jan 2022	Web-based Survey and Field notes
5	Respondent 5: Internal Customers	Survey and Email conversation	Survey created to allow customers provide feedback regarding the Chatbot's functionality	Feb 2022	Web-based Survey and email conversation
6	10 Customers	Survey questionnaire	Proposal building	March 2022, 2 weeks	Questionnaire responses
	Data 2, for Proposal building (Section 5)				
7	Respondents 1-3:	Workshop/ discussion	Proposal building	May 2022 2 hours	Field notes
	Data 3, from Validation (Section 6)				
8	Respondents 1-3: Participants: A/B testers 1 or 2	Group interview/ Final presentation	Validation, evaluation of the Proposal	July, 2022 4 hours	Field notes and recording

As seen from Table 1, data for this Thesis was collected in three rounds. The first round, collection of Data 1, was conducted primarily for the current state analysis. The focus of this round is to gather data on the case company's current use of chatbot. The respondents are internal stakeholders who have first-hand experience and know-how of the business operation, overall sales, and marketing process. A face-to-face interview is scheduled individually to avoid bias. Each respondents' views and responses are documented in a field note detailing the questions asked and answers provided.

Additionally, to have a deeper understanding on what were the actual issues or flaws of the current chat system, it was considered best to consult the end-user to gather their perspective regarding their experiences. For this study, more than 25 customers were

contacted who were originally approached via the chat system, through email and phone, if they were willing to participate in the research. However, only end-users that had successful conversation through the chat system were contacted this time as their opinions and views were relevant in this matter. The most effective method to gather their insights was through a survey because many did not have time for a personal face to face interview for this research. Furthermore, using a Google Form was considered the most efficient and effective way to process and analyze their responses as, first, the survey did not ask for any personal information (so using the Google form was judged to be an appropriate method), and second, it produced a graphical overview of the results.

There was a long break during the stages in data collections, but the objective and goals of this study and the services provided by the case company, as well as its staff and their ways of working have remained the same since the initial stages of data collection and, therefore, the findings were not impacted by the delay. The project timeline was then adjusted accordingly.

In the next round, Data 2 was collected to gather suggestions from the case company for developing the proposal. In addition, this data includes proposals for the chatbot implementation which includes improvements based on the suggestions of the respondents. Whilst identifying the features that can be implemented in the chatbot system, Data 2 can also be used to discover if the current platform can handle all the features as per the case company's requirements. Furthermore, due to lack of resources and budget, only features that can be developed in this study are considered and not all proposed improvements are implemented.

In the third round, Data 3 was collected when conducting validation of the initial proposal. Data 3 included feedback for the proposal from the case company upon testing the pilot version of the chatbot. All feedback is welcome and in case of bugs/defects found during the validation, it will be fixed within the project timeline and requires another round of regression testing to validate the issue resolved. However, internal stakeholders act as the A/B testers during the validation phase, their insight on the pilot version is important to assess if the pilot version matches the case company's needs.

As seen from the description above, interviews were the primary method of data collection. The interviews were conducted as semi-structured, face-to-face interviews, held on the company premises, with questions created in advance. The questions for 3

interviews can be found in Appendix 1. The textual data was analyzed using Thematic/content analysis.

3 Current State Analysis of the Case Company´s Chatbot

This section discusses the business challenge regarding the current chatbot's functionality operating in the CleanLiving Oy's website. However, this section also focuses on the summary of the current state analysis and the issues identified during Data collection 1. First, this section will overview the steps in the CSA and then analyze and pinpoint the strengths and weaknesses of the current chatbot. The results of the analysis will point out which areas the current chatbot may negatively impact.

3.1 Overview of the Current State Analysis

The main goal when conducting the CSA was to get an insight into the overall functionality of the current simplified version of the chatbot. For this end, first, most of the respondents were interviewed face-to-face individually, and field notes were taken. The analysis was categorized into two groups: the internal stakeholders´ and the customer's perspectives

The first set of interviews was conducted with four internal stakeholders, where the CEO, managing director, sales rep and customer service agent participated individually for an hour-length interview. To have a better understanding of how the company's business operations and its strategies, the CEO was interviewed first, followed by the Managing Director who is responsible for day-to-day implementation of the strategies. The Sales Representative and Customer Service Agent were interviewed next to who are mainly responsible for handling the chatbot conversations and marketing operation.

In addition, a survey in Google Forms was also collected from the customers to analyze their views of the problems with the current chatbot and their needs. For this end, appx. 25 customers were also sent out an invitation to participate in this study. However, only 10 agreed to take part as they were simply busy with their personal lives. The customer's perspective was important to the case company to gather insights as the main user of the chatbot. In addition to the fields notes taken during the interview, a survey through Google Forms was asked for them to fill in to get a more detailed overview of their viewpoint regarding the current chat system. They were sent out a respective Web-based survey invitation through Google forms and questions asked about their experience with the chatbot. The survey included predefined questions and answers for the customers to easily select an option in the list which translates into a graph later. The

questions were mostly created to analyze their satisfaction regarding their chatbot interaction before becoming a regular client, and were fully anonymous (therefore, a Google form was selected). At the end of the survey, they were also asked for their recommendation and suggestions for the improvement of the chatbot to increase its efficiency. Based on their responses, the Google Forms report presents the results on the current chatbot system functionality's strengths and weaknesses.

3.2 Description of the Current Chatbot (Design and Functionalities)

Before describing the chatbot, this section outlines the organizational structure of the case company and its ways of working.

Presently, the CEO and Managing Director take full responsibility for the business operations which includes monitoring progress towards goals, reviewing business finances and hiring new cleaners. CEO usually monitors the success of the business as his main responsibility and to ensure that the business goals stay in the right path. On the hand, the managing director guides the cleaner professionals and other employees to perform their tasks effectively and efficiently. In case of complaints and issues in the operations, the managing directly typically finds the right solutions to solve these. However, the CEO and Managing Director analyze the overall performance metrics of the company together which includes evaluating sales, profit and customer overall reviews.

The Sales Representative is responsible for getting new clients, meeting customer needs and acts as the key point of contact starting from lead generation until the deal is closed. His daily schedule is to contact any inquiries generated from all communication channels which mainly come from emails, phone calls and the chatbot. The Customer Service Agent works alongside him and any service orders that come from the communication channels are passed onto the Sales Representative. The Customer Service Agent responds to any type of inquiries and passes those issues to the right personnel, if needed. There are currently 12 cleaner professionals that perform the main cleaning task in the company, to deliver high-quality cleaning services and satisfy the customers.

Typically, about 40% of inquiries are acquired from the chat system in which 20% were order requests. The other communication channels such as email and via phone are used also to handle orders and inquiries. The website visitors get the case company's

details and information directly from their website and choose an appropriate channel to contact the case company.

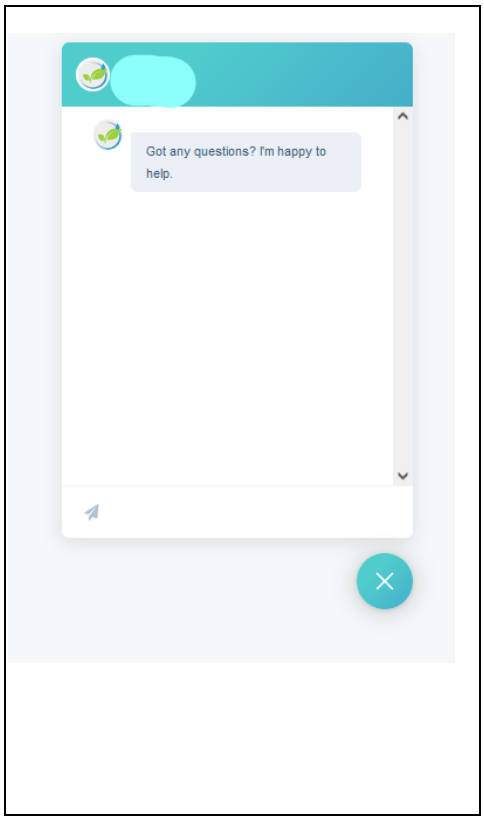


Figure 2. Current chatbot in the case company.

The current chat system was first launched in 2019, it was created by the CEO when there was no customer service agent dedicated for customer support. Because the current chat system does not have any other features than directly assigning each chat interaction to a live agent, the creation of the chat system was very simple. There was no testing period as the functionality of the chat system was very straightforward.

A notification is sent to the dedicated agents (including the CEO, Managing Director, Sales Representative and the Customer Service Agent) with the chat contents. It displays all the inputs of the website visitor, then the live agent can reply quickly to the transcript sent. Basically, the transcript link directs the live agent back to the HubSpot chat inbox where all the other messages from the chat system are accessible. There is an automated message sent to the website visitor in case there is no online live agent to assist him. However, this automated message only instructs the user to leave his personal details, but these details are not collected in the CRM system. The Customer Service Agent goes through the messages in the Inbox in the morning and acts

accordingly. If there are complaints sent by the existing customers, then this issue is consulted with the Managing Director. Otherwise, regular inquiries are scanned through, and she collaborates with the Sales Representative who will be responsible for contacting the new customers. They divide this task together and ask for guidance from the management, if needed. Now, their daily work responsibility requires them to monitor the chat activity during working hours and then the CEO and Managing Director take over during off hours, especially on weekends and holidays. Monitoring and responding to chat conversations requires a lot of manual work which also involves passing information around.

The current chat system allows the end-users *to send messages* to live customer agents in real-time. Currently, *all the internal stakeholders* have a responsibility to respond to any chat interaction based on their availability and there is no allocated time for those who will be online on certain period.

In the current chat, the customers are also encouraged to leave *their personal contact* information in case there's no customer agent to attend to their inquiries. As the company currently employs one customer agent who is responsible for customer service inquiries, sales, and marketing, he/she may not be able to perform all these tasks simultaneously. Therefore, each customer interaction within the chat system cannot be attended immediately. Hence, it may result in losing a potential lead if the end-user is not handled instantly.

3.3 Analysis of the Current Chatbot (Design and Functionalities)

The analysis was categorized into two groups: the internal stakeholders´ and the customer's perspectives.

3.3.1 Internal stakeholders' perspective

This section analyses the collected results of the internal stakeholders' responses on the *(1) design and (2) functionalities* on the current chatbot.

As for the *design* and *functionalities* of the current chatbot (which results in good customer experience with the chatbot), the customers testified on receiving *appropriate*

and relevant information during the chat interaction. For the customers, the chatbot is available through the website that can be reached both via a mobile and from a PC.

At the same time, the internal stakeholder find that the limitation of the functionality is substantial as it fully requires human action at every inquiry Internal stakeholder testified on having access to the chat channel through his/her mobile phone and being able to communicate via a mobile with the potential lead. They are sent a notification to their emails immediately whenever there is a chat activity that requires attention. Then, they can respond to the chat messages by logging into their HubSpot account via phone or PC. In that sense, the chat channel is easily accessible and convenient for the stakeholders.

The chat system usually sends out *a notification* to the internal stakeholders' email immediately as soon as there is an activity initiated in the chat system. Therefore, in that case, if the assigned customer service agent is online during that time, any inquiries can be addressed efficiently.

As for *the Response time*, Respondent 1 noted that there may be a considerable difference in a response to different requests, depending on the time of the call:

> *"I was able to reply quickly to a question sent by a potential lead through the chat system while having lunch. Immediately, I reserved a cleaning time for a lead at the latest available time possible with my phone" (Respondent 1).*

In some cases, when a potential lead tries to contact through the chat system *during off-hours*, this may result in a loss in sales as a customer service agent may not be assisted right away and there is no way to continue the communication with that lead if her information is not collected.

> "*There was an order inquiry for a large residential home that was sent through the chat system during the weekend and requests for urgent cleaning. We tried to contact the user on the following working day, but the user says that she has contacted other cleaning service provider that can accommodate her needs immediately" (Respondent 2).*

There was also a case when other business organizations sent a message through the chat system but due to lack of resources at that time, the stakeholders were not able to respond instantly.

> "*There was a time when a big account was almost missed as we only see their message 4 hours later, luckily they left their company details, and we were able to discuss further regarding their request and needs." (Respondent 3)*

Since other useful *information* regarding the services is already published on the website, *Questions* coming from the leads are somewhat repetitive. The quality measure for FAQs (Frequently Asked Questions) were only asked by the key stakeholders as they are the ones who receive the questions. Respondent 4 adds that

> *"There were a lot of price quotation requests and job applications that the end-users sent through the chat system. However, because there is no way to identify whether each interaction is coming from a lead candidate or a job applicant, it interrupts my focus on other customer service-related tasks. In addition, we have a large of inquiries written in Finnish language, as a non-Finnish speaker, it frustrates me that I can't help the end-user." (Respondent 4)*

According to Respondent 2, aside from price quotation requests, there were questions regarding the service itself and mostly random job applications. There are also other inquiries concerning some more specific details of the service, for example, the cleaning supplies used for cleaning activities. For example, should the case company provide all the needed cleaning supplies, or is it included in the cleaning fee already?

Additionally, the interview questions asked were concentrated on *(3) the impact of the simplified version* of the chat system on the operational level. Since currently all the internal stakeholders have a responsibility to respond to any chat interaction based on their availability (and there is no allocated time for those who will be online on certain period), all the internal stakeholders are involved, which often *interrupts with their other duties.* For example, as the only person who speaks Finnish language is the Sales Representative (whose main responsibility is conducting Sales and Marketing activities),

his availability is limited when helping the customer service agent whenever there is an end-user that speaks Finnish.

Thus, when (1) the questions come in the office hours and (2) there is a customer service agent was *experienced* enough and *knowledgeable,* and (3) if the inquiries were related to, for example, *price quotations* (i.e., the most frequently asked questions), the business impact can be minimal.

Additionally, the chatbot makes a very convenient channel for the first contact and asking for the price without revealing their identity (thus, proving a low threshold to contact the company and a powerful channel for acquiring new customers). The customers can conveniently send questions via the chatbot without revealing their identities yet and be assisted in any concerns they have regarding the services. According to the key stakeholders, about 45 customers including one-time customers and long-term customers were acquired from the chat system this year. The customers' information is managed using the CRM tool in the HubSpot platform and customers were categorized based on the communication channels they were generated from. This gives traceability for the stakeholders which communication channel was effective for them then enhance their marketing strategies accordingly. For example, if the lead was generated from the Website or in social media accounts, they will boost their marketing strategy in that platform to attract more customers.

Table 2 below summarizes the results from the analysis based on the most frequently mentioned topics by the internal stakeholders.

Table 2. Most frequently mentioned topics by the internal stakeholders (in regard to (1) design, (2) functionality and (3) impact of the current chatbot.

Topic
1. Design and functionalities (accessibility via phone and pc)
2. Response time (the challenge of responding in "off-hours")
3. Repetitive questions (with the most needed information being the price quotations), but also unfiltered (unrelated) questions
4. Impact on daily jobs (interruptions caused by responding to the chatbot)

As seen in Table 2, the most frequently mentioned topics related to the chat system overall impact and functionality to the key stakeholders. As per the design and functionalities, one of the key benefits of the chat system is that it notifies the dedicated live agents immediately and the customer service agent was able to help with the order request, booked a cleaning schedule and close a recurring cleaning schedule deal. However, this requires the customer service agent to monitor the chat activity by logging in the HubSpot Platform during her working hours, otherwise she can access the conversation inbox through her phone in case she needs to step away from the PC.

3.3.2 Customers' perspective

This section analyses the customers' responses on their experience with *(1) design and (2) functionalities* on the current chatbot, as well as *(3) their needs, hopes and wishes*

As for the *design* and *functionalities* of the current chatbot (which results in good customer experience with the chatbot), the customers testified on receiving *appropriate and relevant information* during the chat interaction. For the customers, the chatbot is available through the website that can be reached both, via a mobile and from a PC. The customers testified that they enjoy having access to the chat channel through his/her mobile phone and were able to successfully communicate with the company. Also, the customers can conveniently send questions via the chatbot without revealing their identities yet and be assisted in any concerns they have regarding the services.

Regarding the *Response time*, many of the respondents were satisfied with the response time, as they did not have to wait long. At the same time, a few respondents did not agree on having a good customer experience. It was due to the fact that their inquiries were not resolved as quickly as expected (i.e. *the response time*).

For example, it happened in the situations when a potential lead asks for a price quotation with her home size provided, but the current online live agent was not knowledgeable on how to calculate the price based on the service that the potential lead is interested in. The online live agent then asked the lead to provide her personal information instead and she was contacted later via email with the price quotation and details concerning her inquiry.

It became clear from the analysis of the customer responses (as well as records from the previous responses) that customers expect that *the case company already has a knowledge-based chatbot.* For example, one customer sent a message through the chat around midnight and expected to be replied to immediately. He obviously expected that the chatbot would be fully automated and he would not disturb anyone by his request.

There was positive feedback regarding the customer service experience as one of the clients said that the customer service agent was very helpful and friendly, and she received an appropriate answer regarding her question. She was satisfied with the solution that the customer service agent provided her with and proceeded to purchase a cleaning order. In her case, she wanted to know more information regarding the tax deduction from Vero if her "order" will qualify for the household credit. However, the Customer Agent directed her to the official link in Vero where actual calculations can be seen. The lead was then persuaded to proceed with the order as she sees that a big chunk of the sum is going to be refunded to her through the household credit deduction.

About seven of the ten customers agreed that the response time was quicker than they had expected. They were able to receive a reply whilst they were still communicating through the chat system and did not have to wait long. There was a customer when he initiated a chat on a holiday but was glad that there was an online live agent available during that time. However, not all inquiries are attended in a timely manner as the key stakeholders are only human and need time to load their energy during off-hours. Hence, inquiries during those times either need to wait long until they are contacted back by a team member, or their inquiry might be missed.

However, there was an odd question that came from a customer, *"Do I have to clean the house before the cleaner comes?"* Perhaps she was not sure or embarrassed if the cleaners found her home too dirty, so she boldly asked this question beforehand. The customer service agent then confirmed that she does not have to do any preparation prior to the scheduled cleaning as this is the main task and responsibility of the cleaners but they would appreciate if she tidied up a little bit and ensure that her important stuffs are placed in a secured area to avoid any accidents in the future.

In the survey, there was one customer who added that a price calculator would be a great feature in the chatbot, so they can get a precise price estimate without bothering the customer service agent. This will then give him enough time for decision making

without revealing his identity yet. It will then reduce the amount of customer interactions directly with the customer service agent, if all price quotation related matters are handled by the chatbot. Table 3 summarizes the most frequently mentioned topics by the customrs.

Table 3. Most frequently mentioned topics by the customers.

Topic
1. Generally Good Customer Experience / Satisfaction
2. Response Time / Customer Interaction Availability (generally evaluated as good, but with some challenges in the off-hours)
3. Questions Asked (mostly the same questions from the customers, but with some “odd” questions, too)
4. Wishes and needs (list of services and price quotation)

As shown in Table 3, about six out of ten customers testified having a positive *experience* from the chat system and were impressed with the quality of the information received. Most of the customers were impressed with the response time as mentioned above. But there were some odd questions that customers were probably shy to ask.

There was a list of features that customers can select from, in the survey, to identify which features that they find helpful which can be then considered in the development of the chatbot. The majority chose “Show Services”, “Price Quotation” and “FAQ” from the list which gives us a good set of recommendations for the proposal.

3.3.1 Selected Focus Areas

The main focus area, based on all inputs from the stakeholders and customers, is to build a knowledge-based chatbot that will include the strengths of the old chat and will improve all the weaknesses of the old cha system. This topic is discussed next, in Section 4, so that to find relevant knowledge and best practice for guiding the chatbot building for the case company.

3.3.2 Summary of responses

Data collection 1 analysis also gave a view on the usefulness, consistency, responsiveness and quality evaluated by the users from both sides. It also provides insights into the current chat system's overall functionality and limitations.

Based on the findings during Data collection 1, the current chatbot has *significant impact* on both parties, the internal stakeholders and the customers. Figure 3 below shows the assessments by the internal stakeholders and external customers of the current chatbot system´s Quality, Responsiveness, Information Accuracy and Usability.

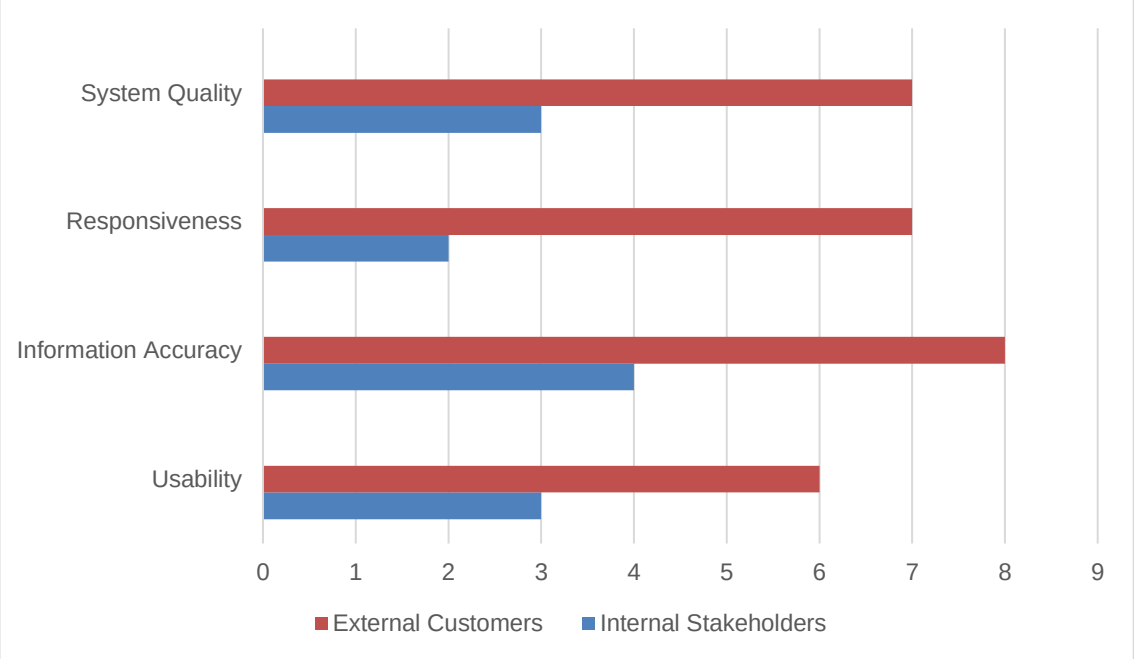


Figure 3. Assessment of the current chatbot system´s Quality, Responsiveness, Information Accuracy and Usability.

As shown in Figure 3, these four features were assessed by the customers and internal stakeholders' responses in the survey and in the stakeholder interviews. The responses gathered in Figure 3 come from two groups of respondents: 4 internal stakeholders and 10 customers. The results show a significant difference between the two groups' responses to the questions pertaining to the system quality, usability and accessibility of the chat system. The survey contains a set of Yes/No questions pertaining to the topics in the above graph. The values presented above are derived from the answers collected with "Yes" responses.

First, *quality* was to assess the quality of the information the customers received if they were contented with the information and their inquiry was fulfilled. For example, the customers can conveniently send questions via the chatbot without revealing their identities yet and be assisted in any concerns they have regarding the services. Some complex issues such as existing customer complaints can also be handled effectively in the chatbot.

In terms of *responsiveness*, about half of the internal stakeholders do not believe the system is responsive enough, since they cannot respond to the chat interaction as soon as possible due to simply not being available during that time. Some customers provided valuable feedback following a chat interaction which rated the chat experience to a positive one. While some customers, we're not quite pleased with the overall experience because they were not responded quickly as they expected.

In terms of the *information* provided by internal stakeholders in response to questions, the customers were most pleased with this. It was evaluated high, as seen from Figure 3 above. This is, most likely, because the customer service agent was *experienced* enough and *knowledgeable* if inquiries were related to *price quotations (i.e., the most frequently asked questions).* On the other hand, the situation might have been different due to language limitations, for example, or absence of the experienced and knowledgeable stakeholder to respond.

For the *usability* measure, the chat system platform was easily accessible with mobile and PC by the website visitors and because it performs like any messaging channel, it works as if the user is communicating in any communication platform. In that case, the website visitors do not need to learn how to use it. However, usability did not get a higher score, perhaps some customers incorporated their views in responsiveness measure as they were not responded quickly.

3.1 Key Findings

This section summarizes the key findings form the current state analysis.

3.1.1 Fit for Purpose (How successfully it is currently used in customer service)

As seen from the analysis above, the chatbot currently boosts operational efficiency by offering convenience to both internal employees and potential clients. According to the interviews conducted with the internal stakeholders, they can instantly provide answers to the client by chatting on their phone conveniently. As the chatbot connects directly to the live agent, whoever will be available at the time when an interaction was initiated, will then continue the conversation with the potential lead. When a potential lead has been assisted successfully and decides to avail themselves of a service, she/he will be then considered as a client.

3.1.2 Fit for Customer Needs (How well it serves the customers)

Usually, the clients use the chatbot for sending messages during the off-hours: night or weekends when it is unconventional to contact via phone calls. They can conveniently send questions without revealing their identities yet and be assisted in any concerns they have regarding the services. It is also a channel, where leads request for price quotations depending on the size of their property and services that they are interested in. In addition, leads can view the list of frequently asked questions and answers corresponding to them. Some complex issues such as existing customer complaints can also be handled effectively in the chatbot.

3.1.3 Strengths and weaknesses of the curertn chatbot

The findings can be grouped by identifying the strengths and weaknesses of the current chat system's functionality. Figure 4 below summarizes the key points of the current chatbot in terms of strengths and weaknesses.

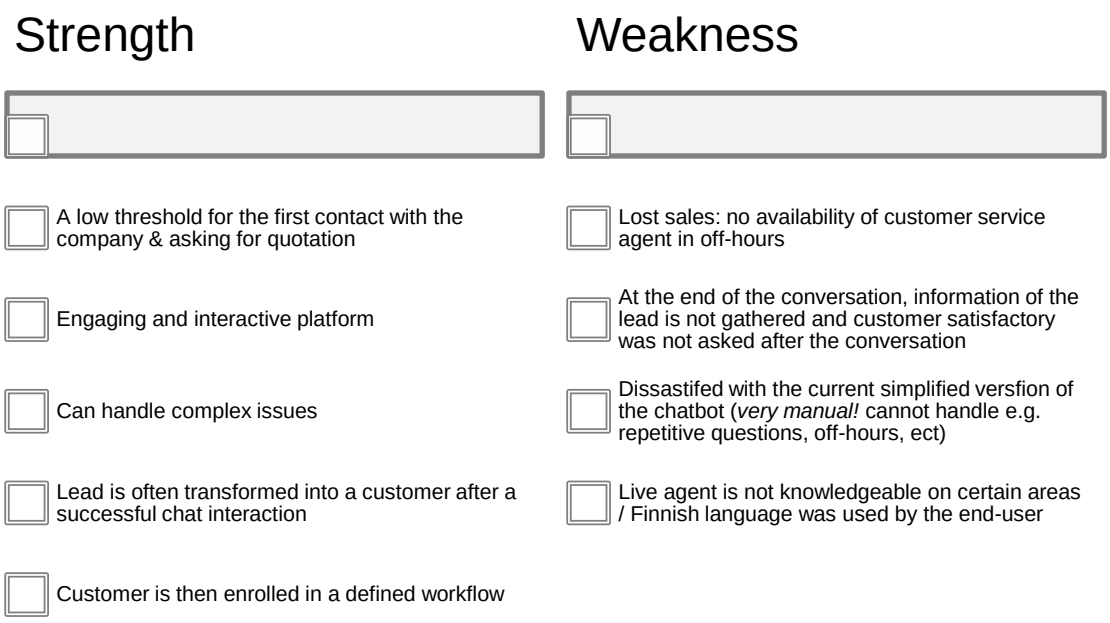


Figure 4. Strengths and weaknesses of the simplified chat system functionality.

First, although the limitation of the functionality is substantial as it fully requires human action at every inquiry, it is believed to be functional enough to resolve complex issues, according to the Internal Stakeholders. Secondly, they are also able to communicate directly to the potential lead by responding through their mobile phones at any time of the day, but this also requires them to step away from whatever they are doing to be able to assist the lead. After successful customer interaction, the customer journey continues, and the potential lead will be transformed as a client and will be enrolled to a relevant workflow for future promotional advertisements. Third, it is functional enough to solve most of the concerns or issues by having a conversation just like in a simple messaging channel.

One of the main weaknesses of the current chat system's functionality is there are cases when a potential lead sends a message during off-hours, and no one was available to respond. Hence, this may result in a dissatisfied lead. Another weakness is when the assigned customer service agent is not too knowledgeable on the area where the potential lead is asking about for e.i price quotations and if the message was in Finnish language. In addition, questions coming from the end-users are usually repetitive, hence it may be tiresome for a customer service agent to reply to the same questions constantly.

3.1.4 Direction for improvement

Therefore, about 30% of the internal customers see the advantage of transforming the simplified chat system into a functional *knowledge-based chatbot.*

When it comes to improving the chat system, Respondents 1-4 acknowledged the need for improvement as they see the benefits of having *a knowledge-based chatbot* on the customer journey. Respondent 2 admits:

> *"It would be great to know what's the intention of each chat interaction at the beginning of the conversation so we can better prepare and respond efficiently with appropriate and relevant information" (Respondent 2).*

The internal stakeholders also laid out some improvement suggestions and added features to the chat system that can handle manageable inquiries such as:

- Booking a Cleaning Schedule
- Price Quotations
- Show Services
- Leave a Contact Request
- Feedback gathering
- Multilingual Chatbot
- FAQ
- Careers.

All the listed items above are from the suggestions of the key stakeholders, mostly because these have been a hot topic in the chat inquiries. Most of the inquiries are asking about the services for example what is the minimum duration to be able to book a cleaning service as the case company requires to have at least 3 hours of minimum cleaning hours regardless of the property size. It is important that both parties agree on

the hours' estimation, before confirming the cleaning schedule to avoid confusion in the future.

For example, if an order request was sent in the chat system, ideally the website visitor wants to know the most available time that matches her preferred schedule. Instead of manually asking the customer service agent what the available time slots for the cleaning are, a booking system gives a view to all the available times that she would like to book a time with. The price quotation is a great feature to give price details before proceeding to book a cleaning schedule.

When the customer service agent recently joined the marketing/customer service team, she started receiving similar questions about the cleaning supplies. Previously, she was a cleaning professional, so she wasn't aware of what was included in the cleaning fees. However, with the help of the sales representative, they listed down all frequently asked questions with relevant answers as an internal document and she goes through this material in case there's a question that is not familiar with.

Leave a Contact Request feature is merely for lead generation, for the customer service agent to follow up with the client regarding her initial inquiry. In addition, the customer service agent doesn't speak Finnish, hence all the Finnish inquiries are passed onto the Finnish-speaking Sales Representative for further discussions. The customer service agent wishes to have a Finnish-speaking chatbot to solve these inquires, so she doesn't need to forward these issues to the sales representative.

4 Existing Knowledge and Best Practice on Building Chatbots

This section discusses the existing knowledge when developing an effective knowledge based chatbot solutions. However, it can potentially solve the issues identified in Section 3 if the objective and the overall design of the chatbot follow best practices when building it.

As there are numerous amounts of service providers that offer Chatbot solutions without programming it from scratch, Section 4.1 covers some of the most used platforms when creating a bot. It also provides some golden rules and what characteristics are needed when implementing one, to make it as engaging with the leads in their first interaction. Section 4.2 explains the chatbot scenario which begins right from clicking the chatbot icon on the website, through providing quick and efficient answers to their questions and asking for the user's feedback. Lastly, a step-by-step guide is shown on Section 4.3 on how to build a knowledge based chatbot in HubSpot and to utilize the platform to create an efficient and innovative chatbot.

4.1 Existing Chatbot Solutions and Benchmarks (How they are designed)

Nowadays, creating a conversational chatbot does not require advanced coding skills as many platforms allow users to develop a chatbot for lead generation without technically writing a line of code. It can be integrated into communication channels easily and start deploying it as a customer service agent. "At the heart of chatbot technology lies natural language processing or NLP, the same technology that forms the basis of the voice recognition systems used by virtual assistants such as Google Now, Apple's Siri, and Microsoft's Cortana." (Shewan, 2022). Conversational chatbot are becoming popular in digitalized businesses partly because developing them from scratch is not needed and some platforms offer the ability to create actions with their drag-and-drop interfaces.

According to Singh et al. (2019), there are two types of Chatbot Development Approaches: AI-Based and Menu-Based Approaches. In an AI-Based Approach Chatbot, when the end-user inputs or selects an element shown by the Chatbot, the NLP engine extracts the information by the user input then decides the outcome of the conversation from the data system. On the other hand, a menu-based approach Chatbot presents a menu to the user to choose from, then those menu items are directed to the

following actions, the advantage of having a menu-based Chatbot is that the response is accurate as the design for the chatflow. (Singh et al. 2019.)

“Chatbots – also known as “conversational agents” – are software applications that mimic written or spoken human speech for the purposes of simulating a conversation or interaction with a real person.” (Shewan, 2022). Today, as chatbot technology is becoming more advanced, it is difficult to identify whether it is an automated chatbot or a human speaking with the end-user.

Below is the list of the most used chatbot frameworks that can be integrated when building own channels.

Chatbot allows to create a customizable lead-generation Chatbot that can be added to the website as a widget. It gathers the potential lead’s data and information and prompts the user to subscribe to their Newsletter at the end of the conversation. In addition, to shorten the sales cycle, prospects can be directed to the live customer service agent for further discussions. Sales processes are automated as it collects data of the potential leads, and these data are sent to the CRM system. (Chatbot 2022.)

HubSpot Chatbot Builder offers an easy-to-use Chatbot builder which can be set up with no coding skills. It can pull data directly from the Customer Relationship Management system to generate personalized messages depending on the target audience and vice versa, all data reflected from the Chatbot interactions are passed to the CRM. For businesses who would like to have a book a meeting functionality, HubSpot Chatbot Builder is a great option as it can automate this task. To create a knowledge-based operated chatbot, publish a knowledge-based library from which the chatbot collects the most appropriate answer depending on the end-user’s input. (HubSpot Chatbot Builder 2022.)

Intercom offers “Resolution Bot” that is customizable, but the pricing depends on the size of the business size and needs. It can be integrated easily to many communication channels and can be developed multilingually. However, Resolution Bot can be tailored and can define specific answers for each targeted group of audience for example, the Chatbot can send tailored response to website visitors that use different devices or plans. (Intercom 2022.)

Salesforce Einstein uses machine learning and Natural Language Processing, like all other Chatbots, to recognize and process the end-users' questions. However, their AI powered Chatbots built right into the Salesforce Platform which gives smart predictions by processing the past data and apply those predictions and use existing rules and pass the case to the respective live agents. (Salesforce Einstein 2022.)

WP-Chatbot is suitable a WordPress website, WP-Chatbot is a plugin that can be installed in just one-click. With its easy-to-use platform, it is easy to create automatic and manual chatbots that can be integrated with Facebook. Conversation History is easily accessible through Facebook and team members can access the messages while marketing business page on Facebook. (WordPress-Plugin Chatbot 2022.)

There are many platforms that offer to create AI chatbots with no programming required. However, testing different solutions is recommended to find the right solution that fits the business needs and intentions. If a business uses a CRM system application, it is best to utilize their applications so it can be easily integrated to the CRM system when qualifying leads. The team members can then work alongside the AI Chatbot for contact and lead management.

4.2 Best Practices on Building a Chatbot

In order to create an AI Chatbot, business practice has developed strategies and approaches to follow before implementing them into a business. The golden rules will help to avoid most common chatbot mistakes that can potentially give negative impressions to website visitors. Therefore, this section focuses on how to create an effective chatbot strategy that needs to be considered before developing a chatbot.

First comes *the Planning stage.* According to Mousumi (2021), the planning stage is an important step to define the business objectives and goals at this stage. Will the Chatbot be specifically designed as a customer support or to help qualify leads? These objectives must be clearly defined prior to building a Chatbot to avoid having an unreliable and inconsistent Chatbot. List the business issues and needs to identify the focus areas and determine the purpose of the Chatbot. Rank all the issues identified and pick up the most important area that needs to be resolved or automate with a Chatbot.

Once the objective and goals are defined, create a simplified mind-map or a conversational flow and plan a chatbot story. Basically, creating a chatbot story visually tells how each chatbot scenario is built and it defines the scope of each feature (Singh, Rama Subramanian and Shiva, 2019). It begins from a start-to-end conversation and each possible chatbot scenario should be covered at any instance. Refer to Section 4.3. Third, find the best solution where the chatbot can be developed with, refer to Section 4.1.

Second comes *the Building stage*. In order to build an effective and engaging chatbot, be mindful of the chatbot's greeting (Mousumi 2021) and it should reflect the company's values and brand. As this is the first interaction of the potential lead with the company, it is necessary to have a good impression to build integrity and trust right from the beginning of their customer journey. According to (Alburger, 2022) adding a little humor to the greetings and responses can give a relaxed atmosphere but don't go overboard and ensure that the personality reflects the tone and voice of the organization. Be creative and use a catchy welcome message then provide a message right away to motivate the website visitor. Below is an illustration on how the "welcome greeting can be modified"

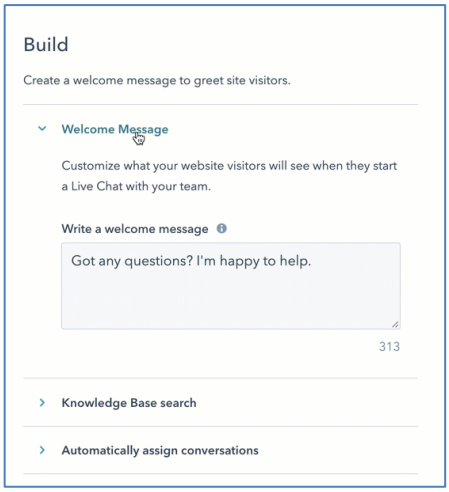


Figure 5. HubSpot, Create a Live Chat, Welcome Greetings (HubSpot 2022).

One can define the Chatbot's personality by allowing to communicate in informal or formal language to the targeted audiences but be transparent that they are communicating with a Chatbot instead of a Live customer service agent. Because the

website visitors might get frustrated if they do not receive the best solution from the Chatbot. (Cornell, 2022.)

Adding buttons are a good way to help the website visitors go through the Chatbot story for example, if they would like to know about the services or Request a Booking directly. The example is a menu-based approach as per (Singh et al. 2019.)

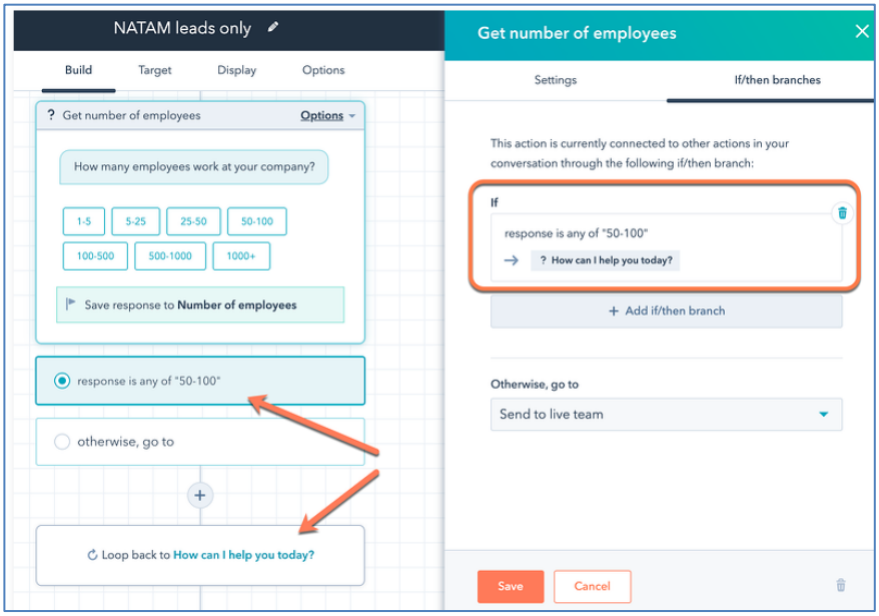


Figure 6. HubSpot Knowledge Base, Use if/then branches in bots (HubSpot 2022).

With the options provided, the website visitor will achieve their goal without writing anything on the chat. Behind those buttons, the user is then directed to their respective chatbot stories. The next step is to add context to each button so they know what will happen to them after clicking any of the options available. (Alburger, 2022.)

Lastly, it is recommended to define the correct fallback message in case the chatbot cannot pull any answers to match the user's questions. This is useful if the chatbot is a knowledge-based bot that requires user's input but remember to instruct the user what to do in this case. Give an option to go back to the beginning and try again. The example is AI-based approach. (Singh et al. 2019.)

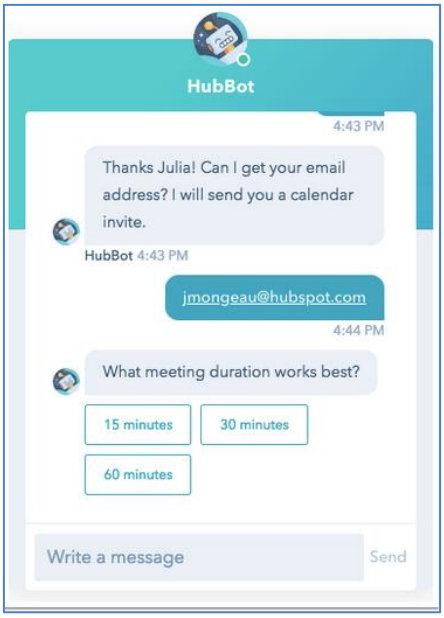


Figure 7. HubSpot Chatbot 2022, Choose your bot action, Book a Meeting (HubSpot 2022).

Next is *the Monitoring stage*. Before deploying chatbot to communication channels, testing it is one of the most important phases. This will help verify if the chatbot is working as expected and the chatbot stories supposedly lead the website visitors to the right actions. It is important that other team members can help and act as beta testers to also provide constructive feedback as they can see many things that were unnoticed during the development phase. This is a good chance to improve in case of inconsistencies found during testing. Once the chatbot is up and running, observe and get to know the users. This will give insights regarding their interests and update the chatbot implementation accordingly. (Cornell, 2022.)

4.2 Using Chatbot Scenarios for Chatbot Building

Business practitioners (HubSpot 2022, SAP 2020 etc.) suggest that the key aspects of the chatbot need to be identified first, the business needs and what is the reason why a chatbot is needed. As per Jaramanan (2020). *"In the bot design process, the Use Case design stage focuses on building the conversational workflows that will perform actions for the user. This helps in automating all the use cases and results in the bot responding relevantly to the users."* Determining each user cases for the chatbot is an important step as this will visually identify each chat stories from the start to the end of the conversation.

Figure 8 below shows a sample of use case when developing a Chatbot with SAP Conversational AI bot-building platform

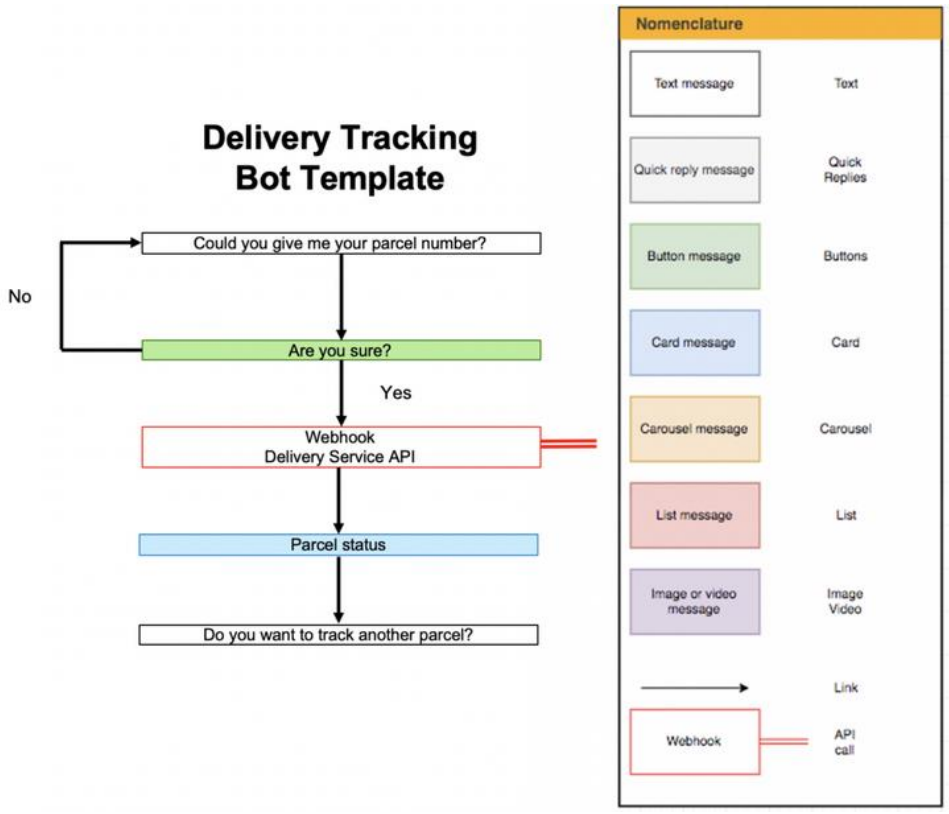


Figure 8. Example of a chatbot used to track parcels (SAP 2020).

Figure 8 above shows how the chat user can track his parcel by providing a valid tracking number to the chatbot. The relevant status of the parcel is then displayed from the API used to pull the information from. If the user doesn't want to proceed to find out the parcel status, he is directed back to the first question, all user cases including negative use case must also be covered, to avoid any fallbacks when the chatbot is deployed. "In this phase, we need to focus on the nominal flow. In other words, a straightforward scenario where everything goes according to plan. The user asks all the right questions, and the bot understands and provides them with exactly the info they asked for." (Jaramanan 2020.)

4.3 Building a Chatbot in HubSpot (How to build, step by step)

HubSpot (2022) recommends using conditional logic to create a more interactive experience for the website visitors. When building a Chatbot in HubSpot, HubSpot recommends connecting the chat channel to the conversation inbox and the tracking code must be added to the website if the chatbot is decided to be available on the website. After this, the chat sessions are assigned to team members based on their availability and also to control who will be receiving incoming messages. (HubSpot 2022.)

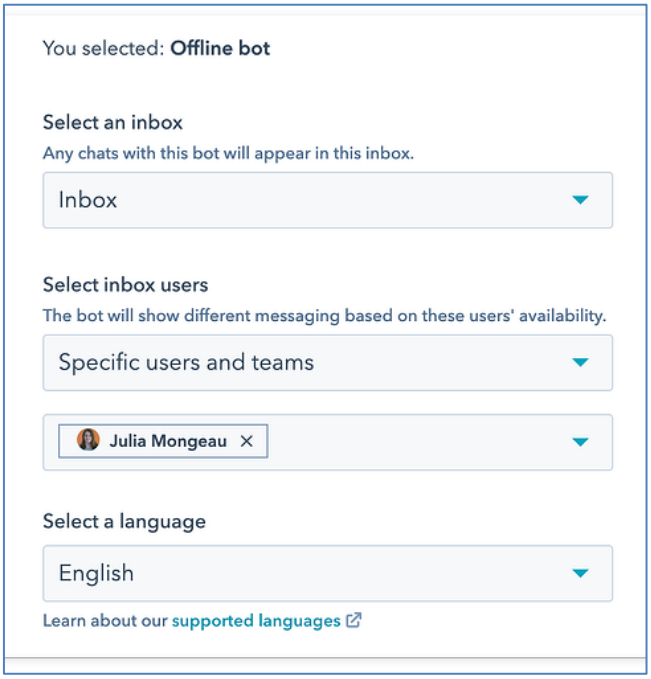


Figure 9. Choosing a Bot, Offline Bot (HubSpot Chatbot 2022).

Figure 10 below shows how to customize the welcome greetings which will be first displayed to the website visitor. Depending on the target audience, you can assign a formal or informal message to greet your users. (HubSpot 2022.)

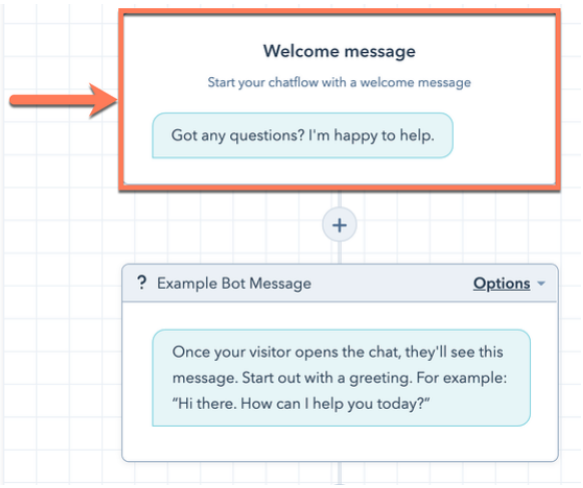


Figure 10. Customizing a welcome message (HubSpot Chatbot 2022.)

Other way to do it is by sending simple messages which do not require a response yet to introduce the chatbot first then ask a question about the website visitor to gather initial information before a live agent needs to take over the conversation. If the chat session is then abandoned, the live agent can follow-up with the website visitor by contacting her with the details provided. (HubSpot 2022.)

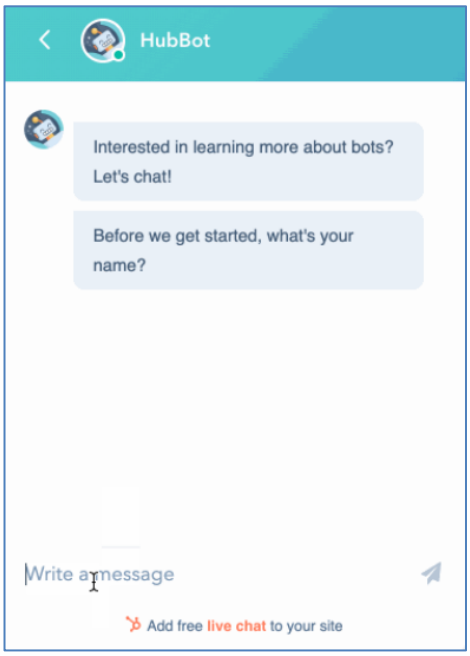


Figure 11. Choose a bot action “Book a Meeting” (HubSpot Chatbot 2022).

Figure 11 above shows how the chatbot collects initial information before going deeper with the conversation.

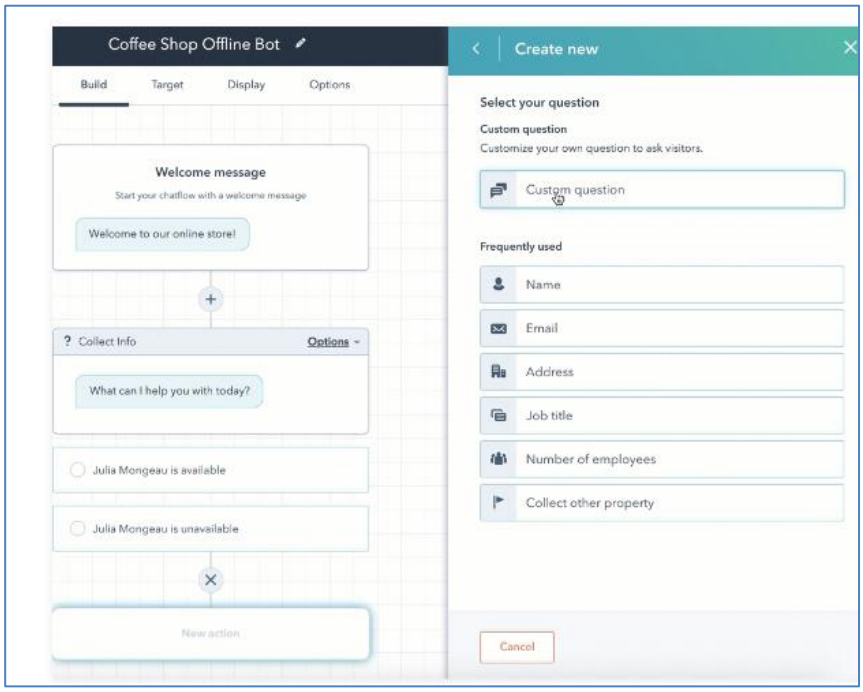


Figure 12. Providing Actions (HubSpot Chatbot 2022).

Figure 12 above shows how action-based responses are then added to identify the intent of the website visitor. Based on the intent of the user, she will select the relevant action in order to proceed to the following actions until her intention is fulfilled. (HubSpot 2022.)

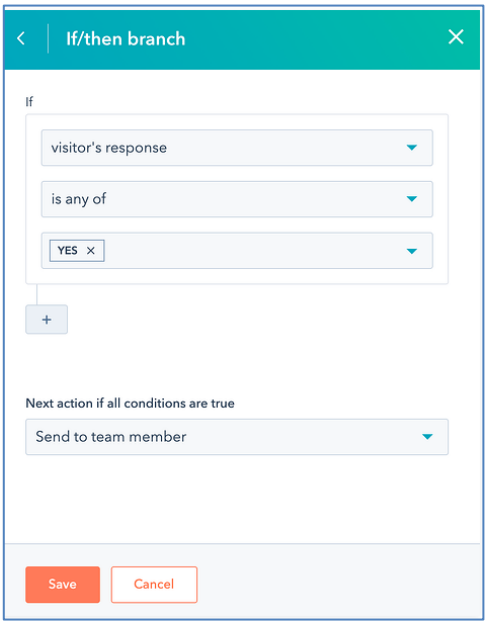


Figure 13. If/then branch (HubSpot 2022).

The next step is assigning the conditions for the If/then branch to direct the website visitors to a specific path. For example, website visitors are sent to different bot actions depending on the selected action, if there was a “Yes” or “No” options and the website visitor chooses “Yes” to the chat question *“Would you like to be connected to the live agent?”* . Once “Yes” is selected she will then directed to the assigned live agent. (HubSpot 2022.)

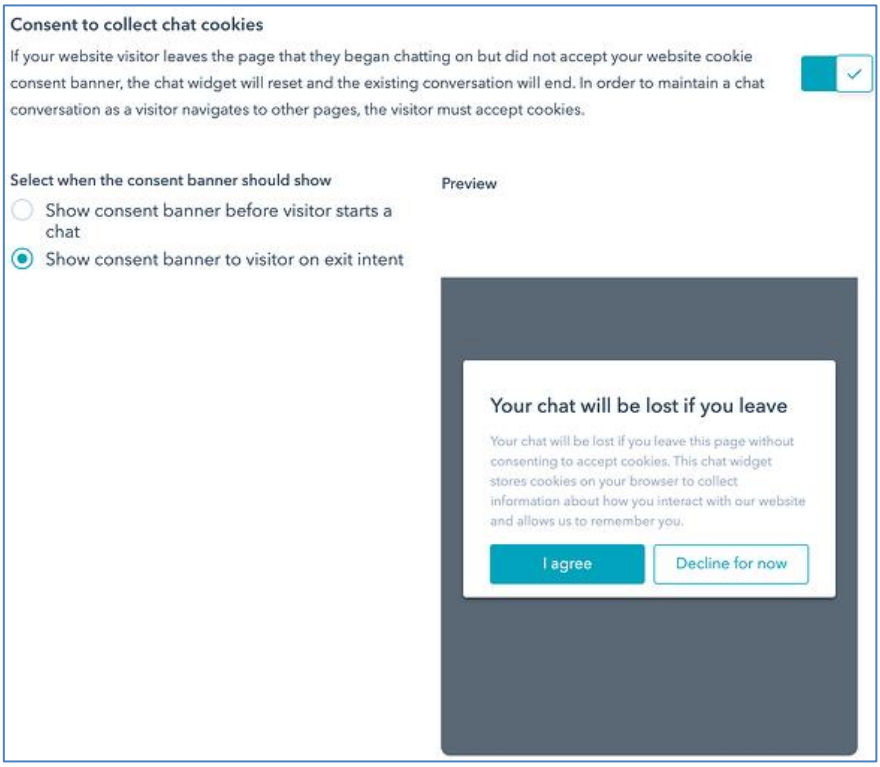


Figure 14. Showing a consent banner to the visitor on the exit intent (HubSpot 2022).

Figure 14 above shows that the website visitor needs to enable the cookie consent text and it is also a consent to collect chat cookies. The user is informed with a message why the chat cookies are used. To maintain the chat conversation while the website visitor goes to the other pages, the cookie request must be toggled so the chat session does not get aborted and timed out. (HubSpot 2022.)

Once the chatbot is ready and all actions including its conditions are assigned successfully, the chatbot can be deployed to the assigned communication channel. Bot’s performance can be then analyzed weather it has been helpful in the customer ends or not. (HubSpot 2022.)

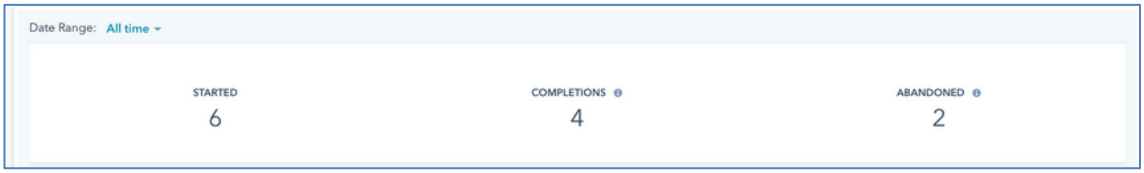


Figure 15. A Dashboard to analyze the bot's performance (HubSpot 2022).

To determine how many chat sessions were established and how many of them reached until the end of the conversation, the chat session rate is seen in the Dashboard in the HubSpot platform. The traceability between the lead generated from the chatbot system can be easily accessed here and a detail on sessions aborted and their time spent interacting with the chatbot. (HubSpot 2022.)

4.4 Conceptual Framework of This Thesis

This sub-section contains a visual representation of this study's conceptual framework and its elements that contain identified tools and suggestions on how to building a Chabot.

As presented in Figure 16 below, the first step was to *Select the platform* for building a chatbot by analyzing existing AI Chatbot solutions, which refers to Section 4.1. Although there are many platforms that offer easy to use chatbot builder to create successful chatbot with no coding skills required, it is best to try out a few chatbot platforms before finally publishing it to the public. Before analyzing and selecting which one is suitable for the business needs, business practitioners suggest to make a list of all the business issues that a company is currently facing and find the most relevant chatbot platform that can solve those issues. AI chatbot can typically automate tasks which can eliminate human effort and boost the team members' productivity. The chatbot solutions provided in Section 4.1 are the most used chatbot platforms that are customizable and can be integrated to communication channels easily.

Second, before developing a chatbot, it is important to *Select relevant strategies* before embarking on the building. As chatbot represents the company's values, the first step would be to ensure that that the chatbot can also communicate formally or informally to align with the company's values and brand. *The Planning stage* helps recognize how a chatbot should be implemented and how it is expected to work. However, *the Building stage* is the actual development of the chatbot where the personality of it can be

assigned. Lastly, *the Monitoring stage* helps to update the chatbot depending on the data that has been collected from the website visitors.

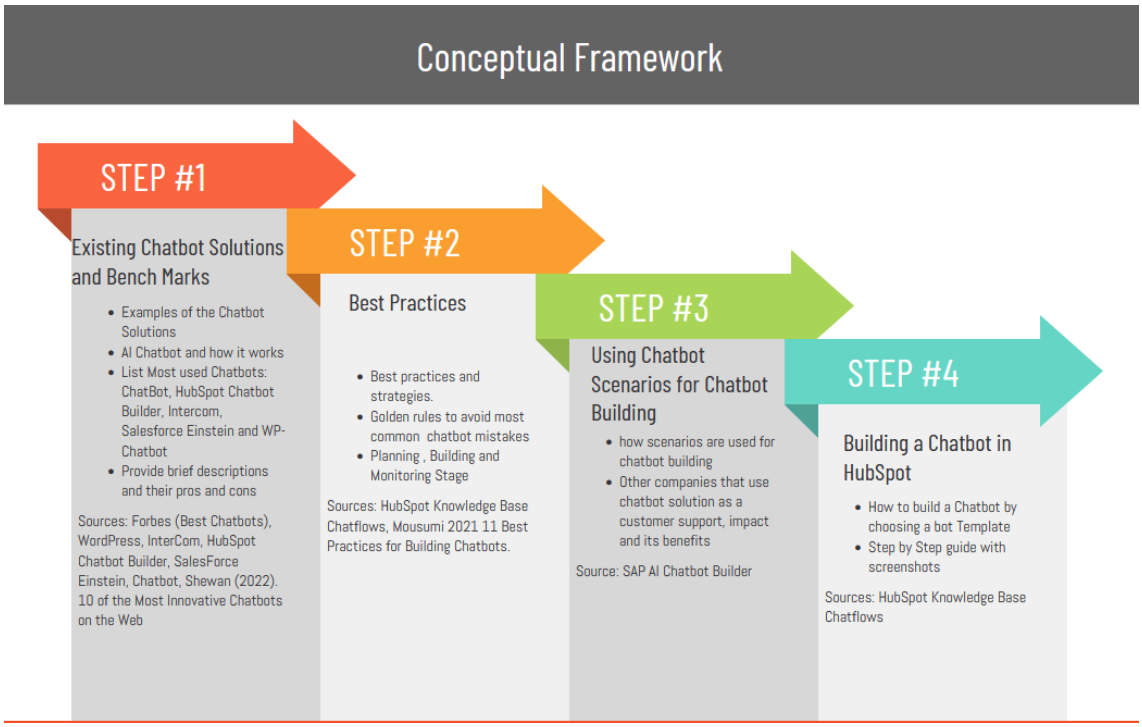


Figure 16. Conceptual framework of this Thesis.

The third element of the CF is to determine and *Use chatbot scenario* depending on the findings in the planning stage whether the chatbot works as a customer support or to qualify leads. A sample of user stories are provided for each chatbot story that was illustrated in Section 4.2.1 and this is then presented to the key stakeholders when planning the chatbot features. However, this illustration will be used as a pattern when building the chatbot for the case company.

Lastly, the developers will need a step-by-step guide for *Building a chatbot.* This study has selected HubSpot for such guidance as shown in Section in 4.3, due to particularly clearly showing how to easily create a chatbot by HubSpot.

Next, Section 5 applies this guidance developed in the conceptual framework shown in Figure 16 for building the actual AI Chatbot for the case company.

5 Building the Chatbot for the Case Company

This section merges the results of the current state analysis and the conceptual framework towards the building of the AI Chatbot using Data 2.

5.1 Overview of the Building Stage

This section presents the steps in building the AI Chatbot with the findings identified in CSA whilst applying all elements established on Section 4. As the current simplified version of chatbot seeks improvements as per the output from CSA.

The results of CSA show that the current chatbot implicates several concerns that were time, customer and budget related issues. First, the Internal Stakeholders admitted that hiring a customer service agent that could be available responding to chat messages 24/7, is highly costly and unreasonable. Some external customers have complaint that the resolution time was rather slower than expected. This results in low customer satisfaction and customer data collection is overlooked if the customer was not attended to on time.

Second, before transforming the chatbot into an AI knowledge based chatbot, it's important to also get familiar with other chatbot platforms that could be considered other than sticking with HubSpot as in the initial plan. However, the Internal Stakeholders agreed to stay with HubSpot after other chatbot platforms were proposed. Third, a meeting was held among the Internal Stakeholders to identify what features are the most important to implement in the chatbot. Therefore, Illustration 1 in Section 4.2 was also presented to them, to have a visual idea on how the chatbot stories will flow and what elements can be added. They came up with suggestions on how the chatbot should be named, other additional features and setting the chatbot into a multilingual so it's able to interact with website visitors in Finnish as well.

5.2 Initial Inputs for Building the Chatbot

For Data Collection 2, an interview was conducted to collect suggestions from key stakeholders following the findings from CSA that were presented to them. These inputs will be put into consideration whilst producing a plan on how and when these features

will be implemented. Each key stakeholder gave their own proposition that were affecting certain business areas and believe that improving the chatbot could potentially resolve those issues. The main inputs are listed in the below table according to each key stakeholders' suggestions.

Table 4. Key stakeholder suggestions (findings of Data 2) for Proposal building in relation to findings from the CSA (Data 1) and the Conceptual framework.

*Key focus area from **CSA** (from **Data 1**)*	*Input from literature and best practice (**CF**) on the topics of:*	*Suggestions from stakeholders for the Proposal, summary (from **Data 2**)*	*Description of their suggestion (in detail)*
1.Improving the simplified version of Chatbot system and its limitation 2. Building a knowledge-based version of the chatbot	1.Selecting the platform 2.Selecting the strategies 3. Using chatbot scenarios 4.Building an automated knowledge-based chatbot (based on a library for the frequently asked question)	a) Developing a chatbot which can provide price quotation and lead generation.	According to the CEO, if the answers are automated, it can eliminate such mundane tasks from their side as any machine is proven to work quickly if utilized correctly.
		b) Booking system, Job opportunities, List of Services, chatbot's ability to communicate both in English and Finnish	The Sales Representative and Customer Service Agent believe that a responsive booking system developed within a chatbot can effectively ease their work as their effort to manually book a time for a client is reduced. In addition, a separate query for job applicants as this subject is handled separately.
		c) List of Frequently Asked Question	According to the Managing Director, she heavily suggested to have a list of Frequently Asked Question where leads can go through and find the most suitable solution regarding their concern. Basically, the data from the FAQ are also applied within the chatbot System.

As seen from Table 4, the CEO suggests having a price quotation feature as there are times when a live agent was not up to date with the current pricing of the service. Therefore, automating the response for the chatbot will reduce human effort on providing price quotation depending on the property size of the client. For sales and marketing purposes, one of the main advantages of having an AI Chatbot is that it generates leads by helping them turn their interest into sales. Therefore, the CEO believes that if the AI chatbot can qualify leads and collect data, it will boost their marketing approach.

Basically, their personal information is then passed onto the CRM system and continue their customer journey from there.

Because the sales representative and customer service agent take full responsibility with the chatbot activity, they have primary experience on what the inquiries were mostly about. According to the customer service agent, about 40% of the inquiries were regarding services in which similar questions were asked frequently. About 20% of the website Visitors, asked for a cleaning scheduling and 20% for price quotations. In addition, they have also received many job applications, which is about 20% of the inquiries from chatbot. The customer service agent added, that if each activity from the chatbot can be grouped so it doesn't clutter their inboxes for example, having all job applications in a separate group so once there is a job opportunity available, they can easily scan each application and find the suitable candidate for the job.

A meeting was held with the managing director to list all the frequently asked questions and prepare an answer for the selected questions. Ideally, this set of questions and answers will be saved under the Knowledge Base Library in HubSpot where the chatbot retrieves information from.

5.2.1 Planning the Chatbot

Step 1 in Planning: Developing the Chatbot scenarios

Below is an illustrated mind-map on how the customer journey flows in scenarios where the end-users may lead when choosing elements on the chatbot system of the case company. Ideally, these chatbot scenarios presented below are used as a guide when developing the AI Chatbot for this study in Section 5.

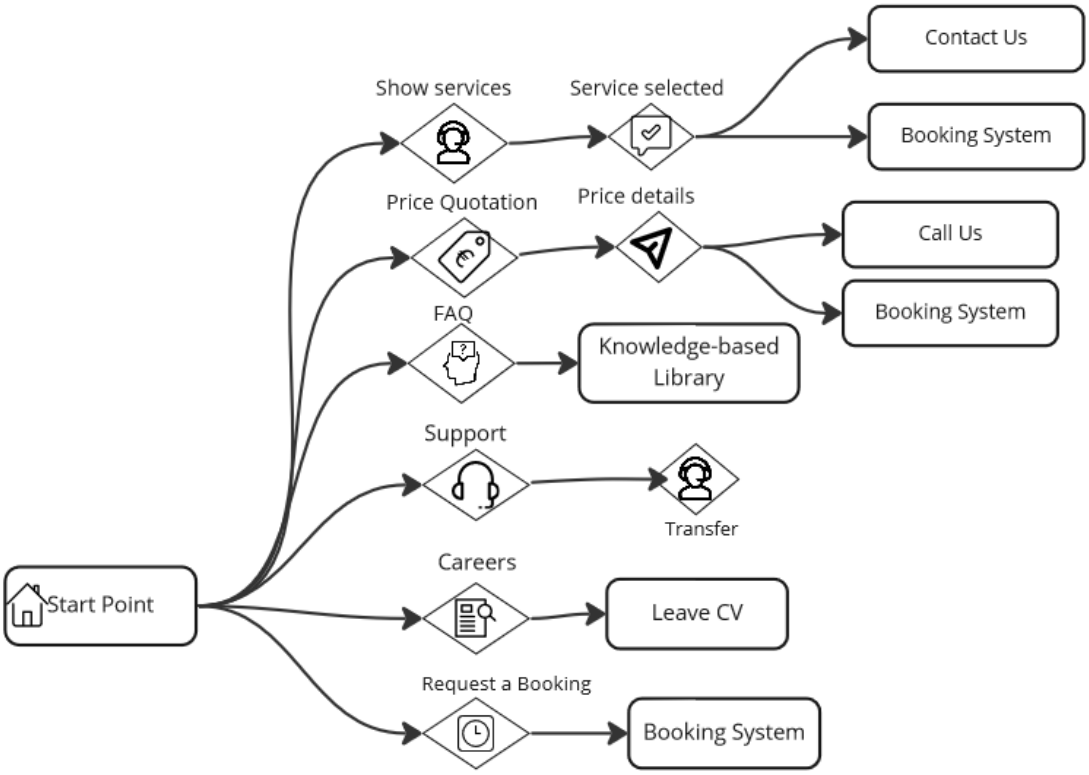


Figure 17. Chatbot scenarios with possible chat stories.

The Start Point represents as the beginning of the chatbot interaction established, the chatbot will then immediately respond by providing the list of options where the user can select from. It will show a pre-defined list which requires an action from the user to proceed further. Each scenario will be explained below:

Chatbot scenarios

- Scenario A. User wants to be familiarized with the services that the company is providing. Firstly, Bot welcomes the user and is shown four elements such as Show Services, Price Quotation, FAQ, Support, Careers and Request a Booking. User then selects “Show Services”, Bot quickly pulls a set of elements that were defined in the library which contains the list of services. Based on the selection, Bot shows the details and price in a short, summarized form and then the user is given an option to proceed to Schedule a Cleaning or price quotation. The user is then asked whether she/he wants to be contacted by the sales agent or wants to contact the sales agent. The website visitor is then also given an option to

proceed with the booking system. At the end of the conversation, feedback will be collected from the user to assess if the inquiry is solved by the provided information. The feedback is later utilized to further develop the chatbot system.

- Scenario B. User selects “Price Quotation” from the list of elements, Bot will then ask the size of the property that needs cleaning. A rough price estimate of the service will be then shown to the user then she is given an option if she/he wants to be contacted by the sales agent or wants to directly contact the agent instead. The Website visitor can also proceed to the main booking system and choose the service she/he would like to avail himself. Like in all other scenarios, feedback is collected at the end of the conversation.

- Scenario C. If the user has an idea of what to ask, she can proceed to the FAQ option and input keywords regarding her questions. For example, by writing a “holiday” text, the chatbot pulls the relevant information from the knowledge base library and displays the most appropriate answer to a question.

- Scenario D. User can directly be connected to the live agent or currently online customer service agent and continue their communication further. At the end of the conversation, the user can give feedback based on the chat experience.

- Scenario E. In the case of job applicants. They can choose “Careers” from the options provided where they can leave their personal information and their resume in pdf form. Later, if there is a job position available, the team member will scan through the applications and contact the right person suitable for the job.

- Scenario F. If the user selects “Request a Booking” option, this will direct the user to the right website URL to proceed to the booking system. There is a separate booking system for each service as the length of minimum cleaning hours varies with each service. The Customer Service Agent who is responsible for task assignment to the cleaners can find the right and available cleaner based on the service and time booked.

Step 2: Implementing a Knowledge Base Chatbot in HubSpot

The chatbot solution chosen to implement is a knowledge-based chatbot is with HubSpot as the simplified version of the chatbot is developed with it. This section focuses on how to build a Knowledge-based chatbot with HubSpot with a step-by-step guide.

Step 1: Create an account in HubSpot and connect a channel to the conversation's inbox. Then connect the website to the chatbot by adding the tracking code to the external pages where the chatbot widget is going to be displayed.

Step 2: In the HubSpot Account, click Conversations > Chatflow and a new page appears.

Step 3: Click the Create chatflow in the upper right corner.

Step 4: Select Website if it needs to be integrated with the website or Facebook Messenger if the chatflow is intended for Facebook. Click Set up Chat at the pop-up message.

Step 5: Personalize the accent color of the chatbot, the color chosen will be visible in the icon and the header's background

Step 6: Customize welcome greetings as this is the first message that the website visitor sees, make it as engaging as possible. Give a name for the chatbot in case personal name is not used. Other details can be modified later.

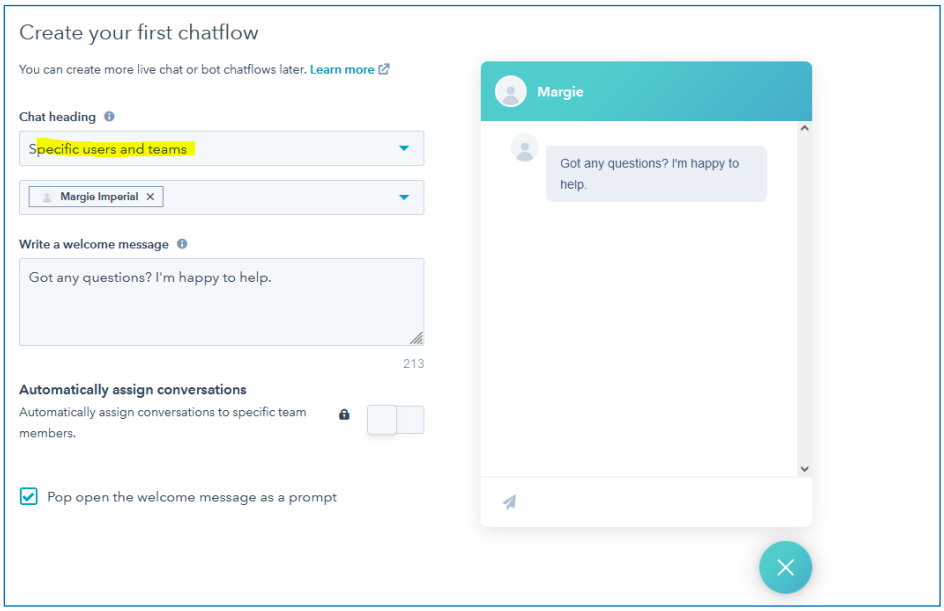


Figure 18. Chatbot, "Welcome Greetings".

Step 7: Select a time frame for when the chatbot should be available. If this relies on the Live Agent's availability, adjust the time availability according to their working hours. Otherwise, the chatbot can be available 24/7 by clicking the check box "Chat is available 24/7".

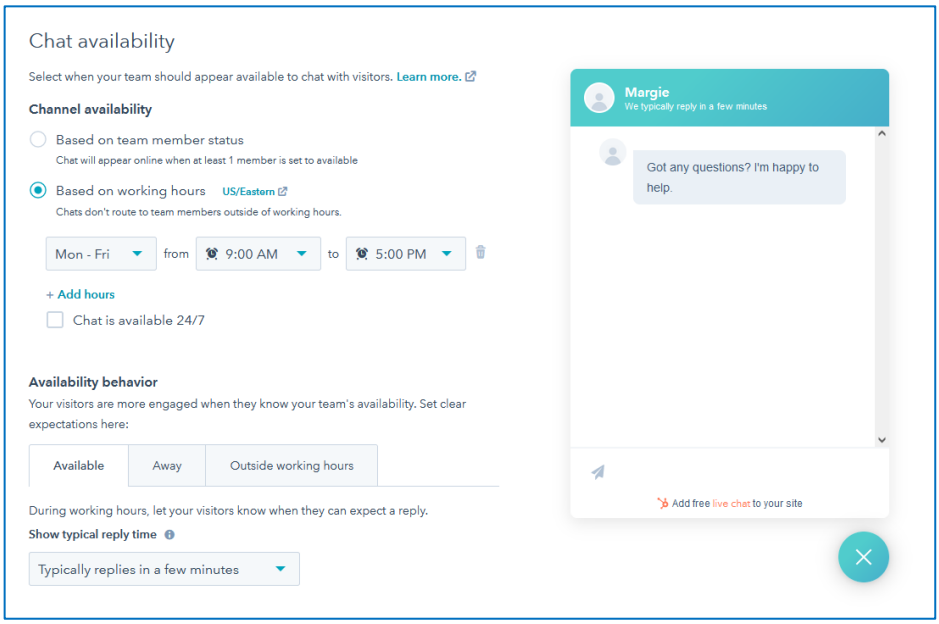


Figure 19. Chatbot, Availability behavior.

Step 8: Proceed to preview and install the code snippets by copying the tracking code to the website.

Step 9: Alternatively, if there's one chatflow previously created. When creating a new one through the Create Chatflow in Step 2, it shows template options, and each has features already built with. Select the most appropriate bot template according to the needs.

- Live Chat – Connects directly to the online customer service agent
- Knowledge base + live chat – Use this template to share knowledge base articles to the website Visitors. This is very useful if there is a list of frequently asked questions to eliminate time spent responding to repetitive questions.
- Concierge bot – live chat and knowledge base templates are combined in the concierge bot.
- Qualify leads bot – gather information of the potential lead by asking their reason on visiting the website.
- Meetings Bot – share a meeting link where they can conveniently book a time with the team.

- Tickets Bot – Use this template as a visitor support inquiry. They can create a ticket regarding their issues then update the tickets when they are addressed.
- Offline Bot – If the chatbot is set to be available only during business working hours when a customer service agent is online. Use this template to gather website visitor's email when it's offline so the customer service agent can later contact the visitor for further discussions.
- Start from scratch –choose this to build the bot from scratch then later bot actions or features as it is developed.

Step 10: For demo purposes, if the Knowledge base + live chat template is chosen, this prompt to first publish at least 3 articles where chatbot can retrieve the data/information from.

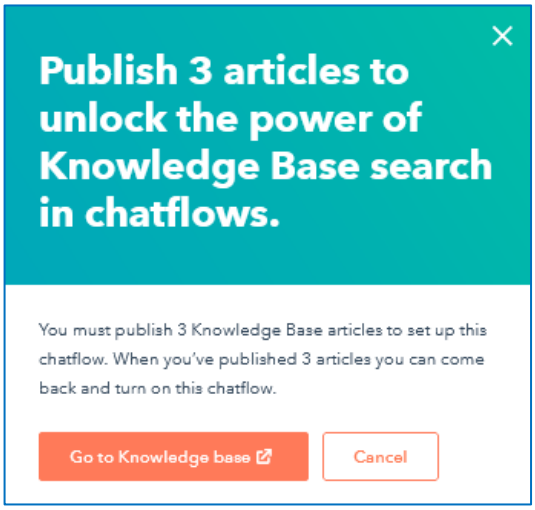


Figure 20. Chatbot: Knowledge Base articles.

The chatbot scenarios and stories were created during the Planning stage, that is used as a guideline when implementing each feature and its relevant chat scenarios in the chatbot. The features considered were from the suggestions of the key stakeholders which includes Price Quotation, Show Services, Booking System, Support, Careers, FAQ and multilingual chatbot. However, these features are developed in two separate sprints due to time constraints and resources. The features are prioritized based on the risk level and possible impact to the company's operation.

5.2.2 Building the Chatbot

After the account has been created following the steps in Section 4, the building of the AI Chatbot starts for the case company.

Step 1: Assigning a Name and Personalizing a Welcome Greeting

The key Stakeholders chose the name “Mari” for their Bot and a welcome greeting is assigned afterwards. As part of the best practices, Bot should be engaging and informative to ensure that it has the ability to help the website visitor.

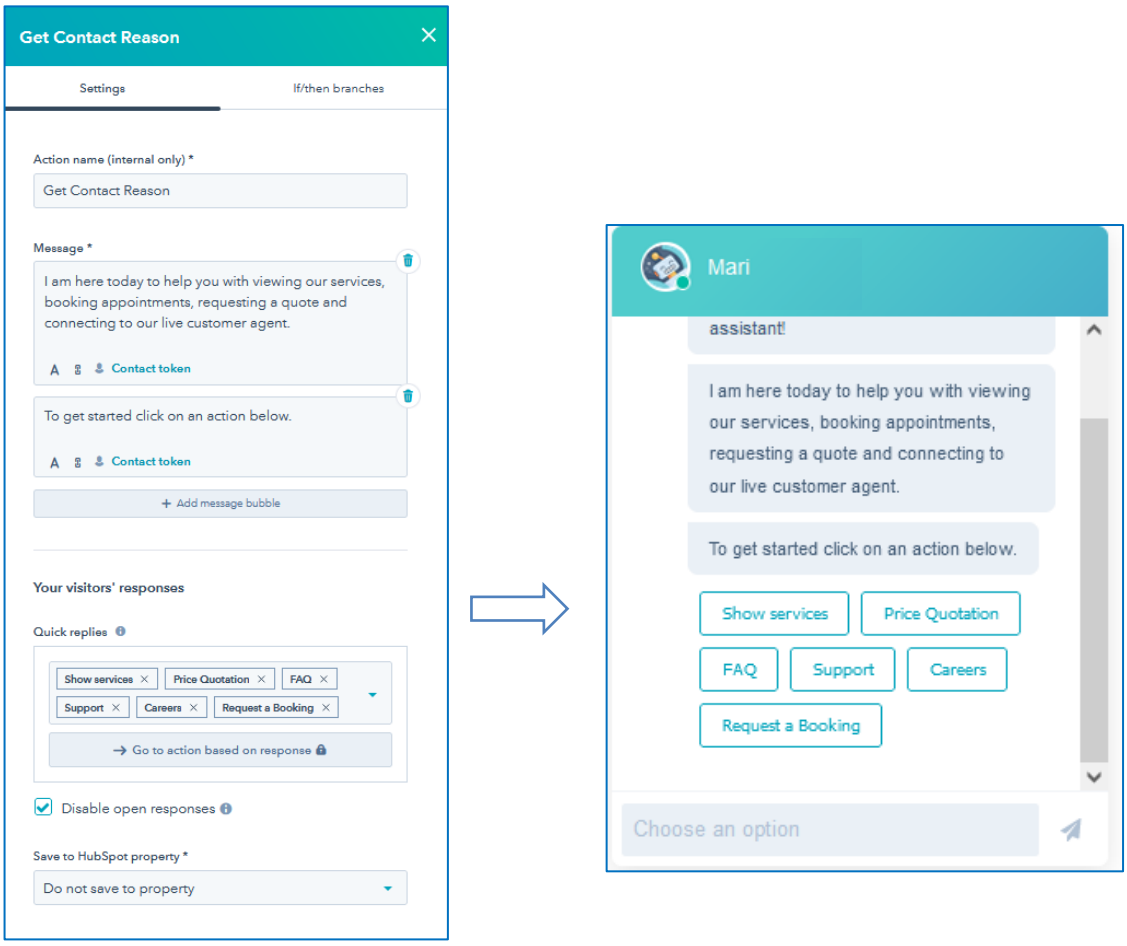


Figure 21. Chatbot scenarios with possible chat stories (“Select a Reason”, on the right side, and “Chatbot Output” on the right side).

In order to list the elements that will be presented to the Website Visitors, the features suggested in Section 5.1 can be added as action bases responses. Basically, it prompts

the user to select an option before proceeding to the following pages. The website visitors will be then directed to their targeted action from the quick replies selected.

Step 2: Assigning If/ then branches

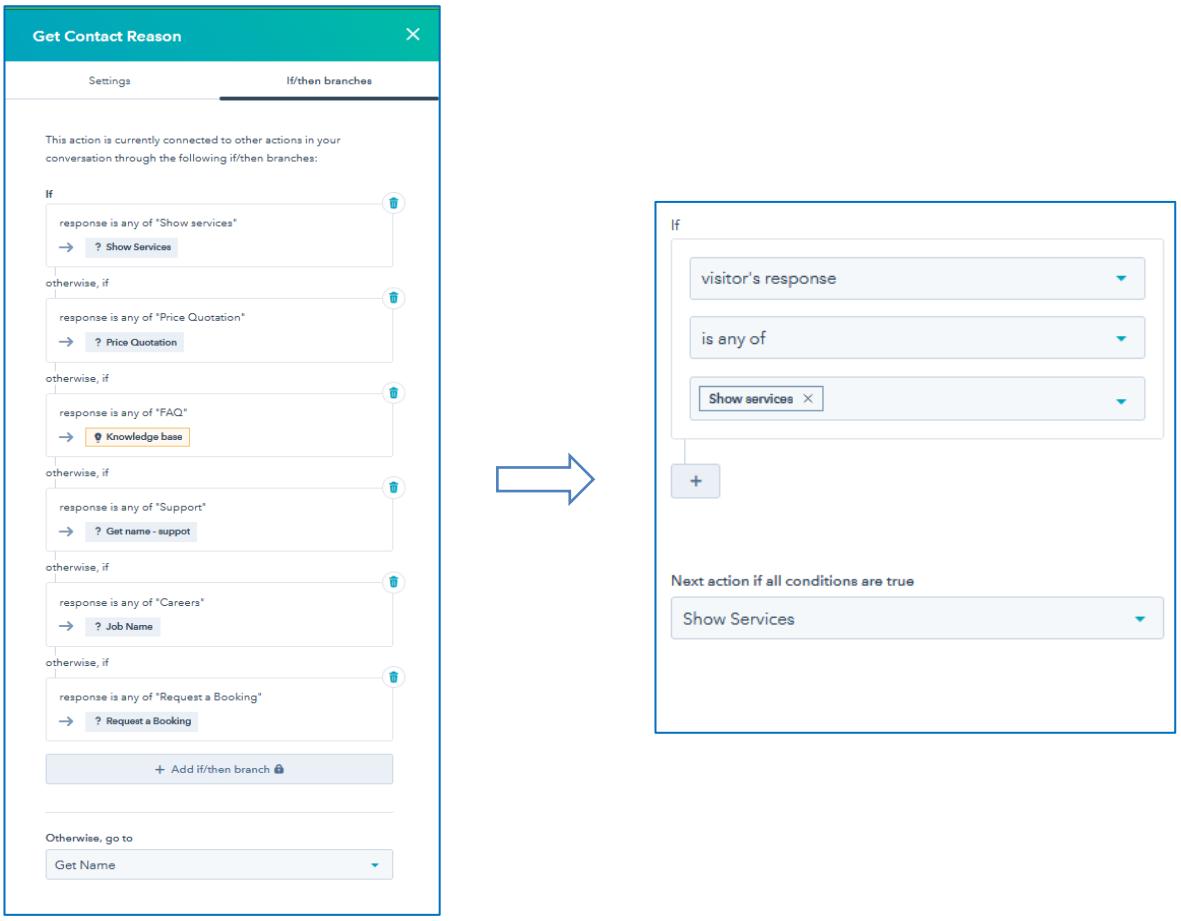


Figure 22. Chatbot scenarios with possible chat stories ("If/Then branches", on the right side, and "Assigning the next action" on the right side).

Each action should be connected to their respective actions in the conversation through the following if/then branches. Basically, the purpose of the if/then branch is to assign the next action if the website's visitor selected "Show services" as an example above in Figure 14. Assign all of the quick-replies options to their respective actions.

Step 3: Assigning if/then branches for quick replies.

As seen in Step 2, the steps done here are similar. If the action contains a set of quick replies, they should also be assigned to the following actions correctly. Basically, if the web visitor clicks "Home Cleaning" from the list, she/he will be directed the Home

Cleaning Action. Figure 15 illustrates how it is visually shown to the Website Visitor.

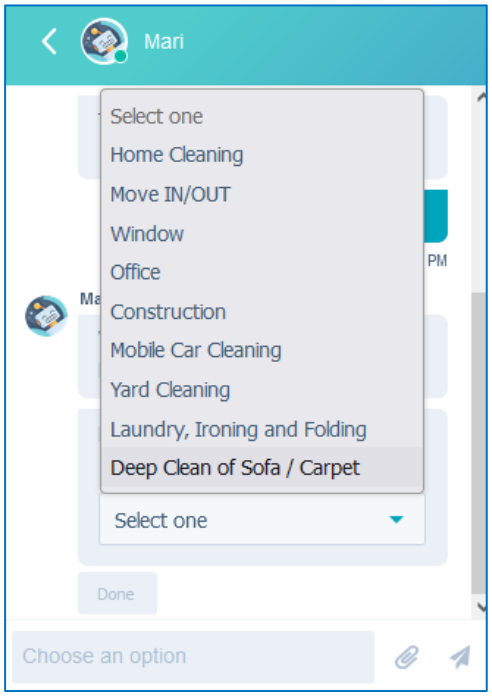


Figure 23. Show Services.

However, the back end of these actions is implemented as in the figure below. Each cleaning service contains cleaning description and pricing; hence it is better to have an individual action-based response for each.

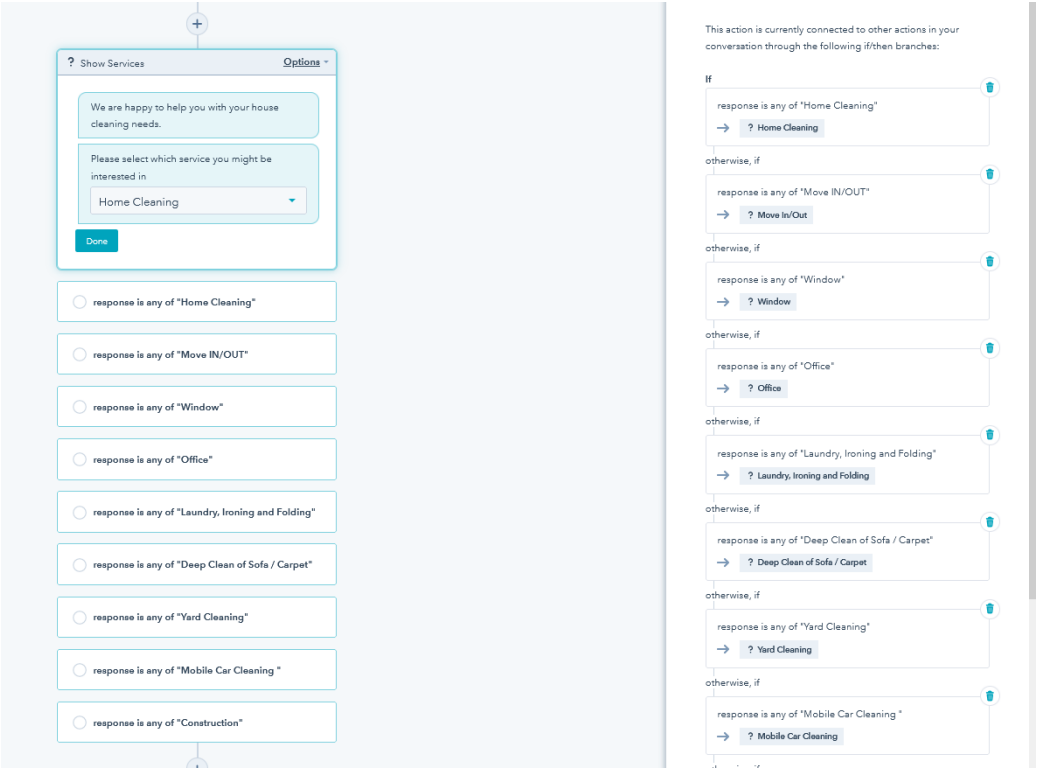


Figure 24. Back-end of “Show services”.

Step 4: Price quotation

As the HubSpot Chatbot does not have a calculator widget, the price estimates should be calculated individually depending on the property size. These calculations come from the internal document produced by the Case Company during Data Collection 2. The calculation varies from the size range as seen on the figure below.

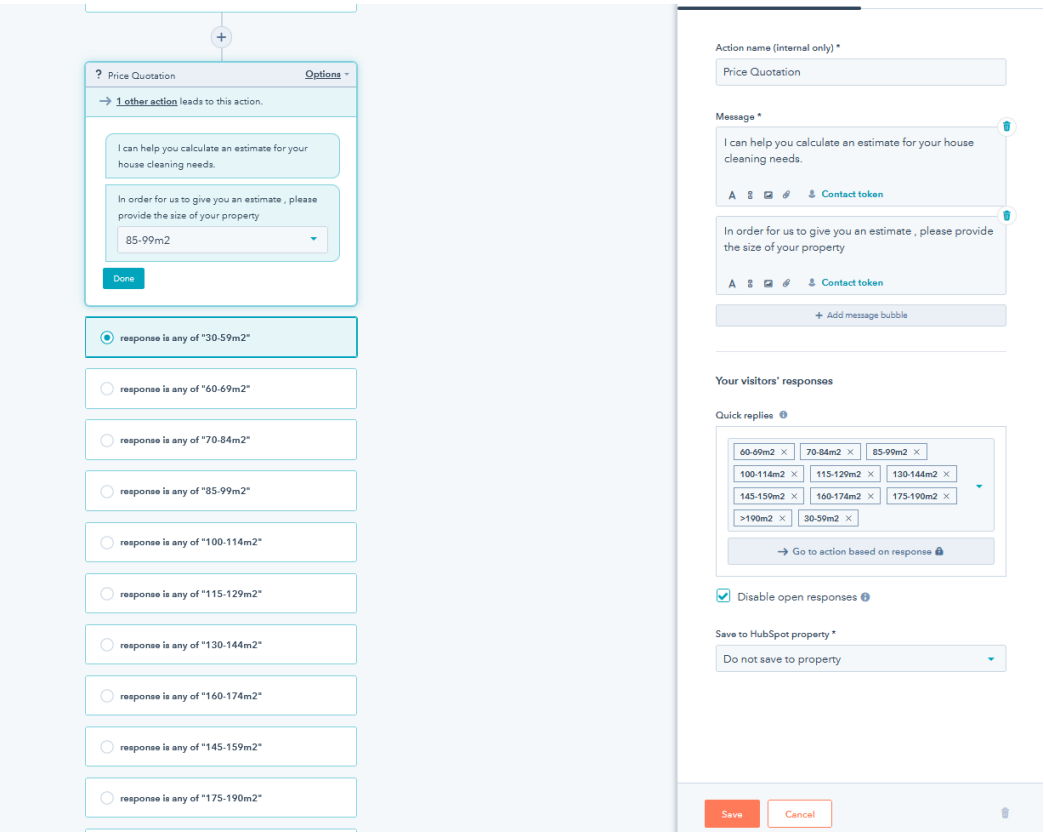


Figure 25. Price Quotation.

Assuming the website visitor selects 115-129m2 as the property size, chatbot then displays the corresponding calculation as in Figure 17 8. The estimated price is shown and a tip on how to claim a tax credit benefit for household expenses in Vero. Key stakeholders requested this special message to be included so that the website visitor is aware of such benefits which may influence her/him to continue purchasing a cleaning service.

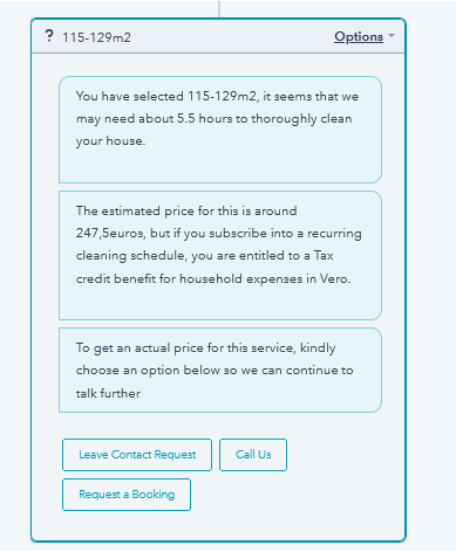


Figure 26. Price Quotation Sample.

In addition, as in any other action bases responses seen at the earlier steps. There is also an option to Request a Booking, Leave Contact Request and Call Us forms. Once, the website Visitor process to the “Leave Contact Request” form, her contact details are collected, and she will be transformed as a Lead at this point. An online customer service agent will contact the lead for further discussions.

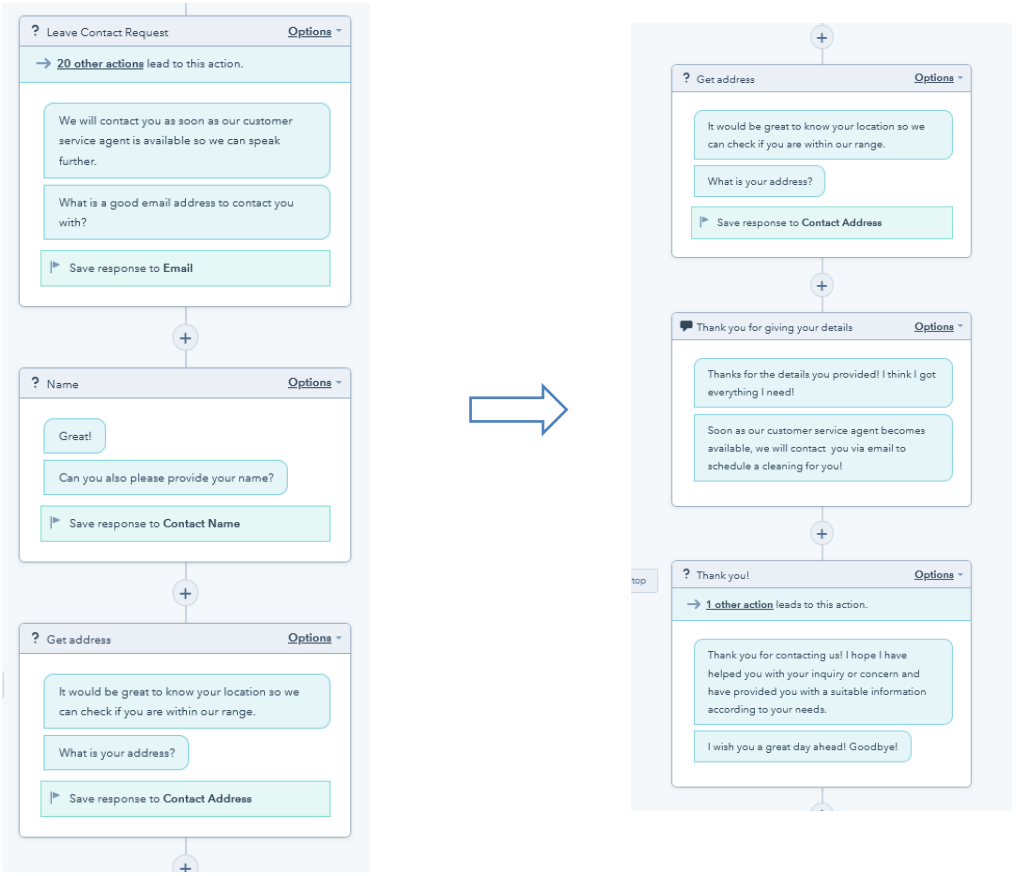


Figure 27. Chatbot scenarios with possible chat stories (“Leave Contact Request1/2”, on the right side, and “Leave Contact Request 2/2” on the right side).

The personal information collected in Figure 18 is passed on to the CRM system, a team member will then enroll in this lead to the relevant workflow templates for marketing purposes.

Step 5: Request a Booking

When a website Visitor is lead to the Request a Booking action from any action-based response, she/he is shown a link that directs to the Booking System in the Case Company’s website

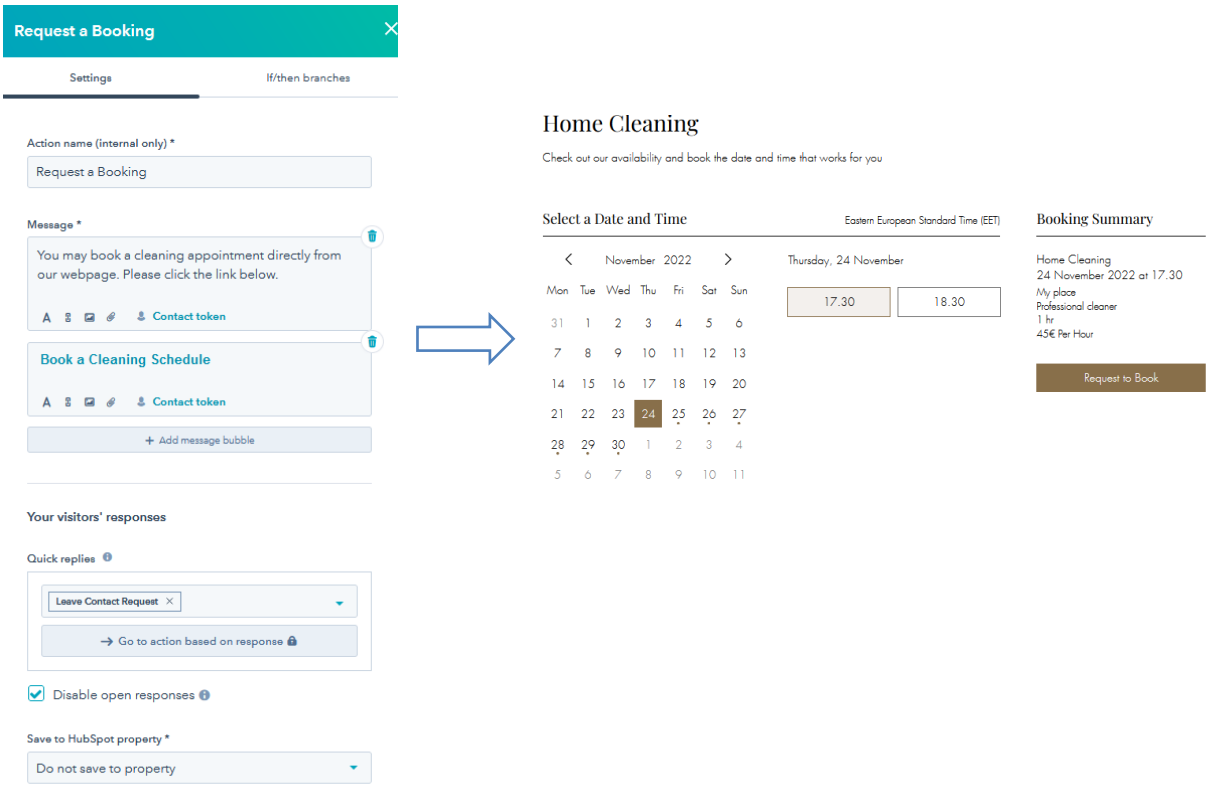


Figure 28. Chatbot scenarios with possible chat stories (“Request a Booking Action”, on the right side, and “Booking System” on the right side).

HubSpot Chatbot platform does not support a booking system widget and the built-in book a meeting feature must be used instead. But because of the built-in booking feature can’t be integrated to the Case company’s existing booking system. The key stakeholders have decided to include a link towards the booking system rather than utilizing the one in HubSpot.

Step 6: Support

If the Website Visitor wishes to speak directly to an online customer service agent, a notification is sent to the live agent that there is a conversation request initiated by the website visitor. The chatbot will automatically gather the website visitor's personal information in case there is no live agent available, and to continue the lead generation.

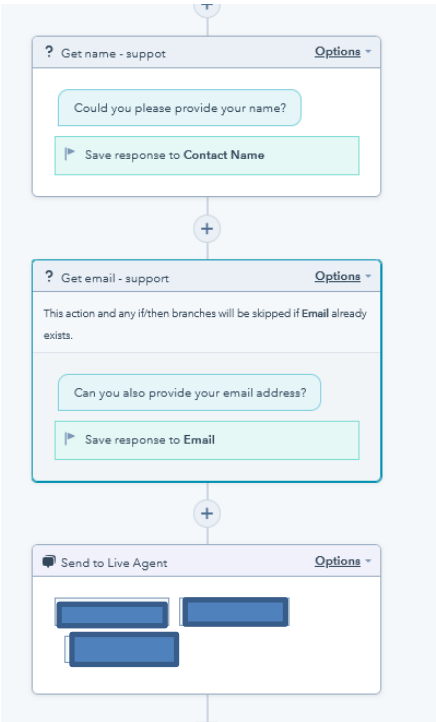


Figure 29. Support – Connect to the Live Agent.

Step 7: Knowledge Base

To have the knowledge base library feature in HubSpot, the account user is required to upgrade to the Sales Hub Professional Plan, the pricing depends on the company size and its users. As mentioned in Table 2 in Section 5.2, the development for Knowledge Base functionality will be implemented on Version 2 of the chatbot if the key stakeholders agree to upgrade the current subscription plan. However, HubSpot allows a 14-day trial to try the Knowledge Base feature, we were able to publish articles within the Knowledge Base library and test them out. The output results are then proposed to the Key Stakeholders. The knowledge base is used for Frequently Asked Questions and all the questions were literally asked by the customers either through chatbot interactions or from other communication channels.

Before creating a knowledge base library, Hubspot prompts to create at least three articles. Go to HubSpot Account -> Service and Knowledge Base then click the Create article button on the right-hand side of the page.

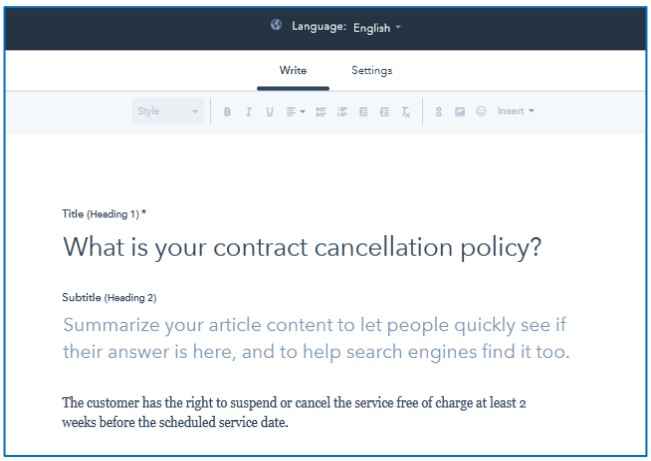


Figure 30. Knowledge Base – Cancellation policy.

This is one of the most asked questions by the customers, hence this is used as an example for this demonstration purposes. After the answer to the Title or Question is provided, click Settings and assign a Category for this article, then publish it. Once, at least 3 articles in the KB are published, continue activating it in the chatbot. Go back to the chatflows under the Conversations tab and enable the Knowledge Base icon as seen in Figure 23 below. This activates the KB functionality and applies Artificial Intelligence to the chatbot.

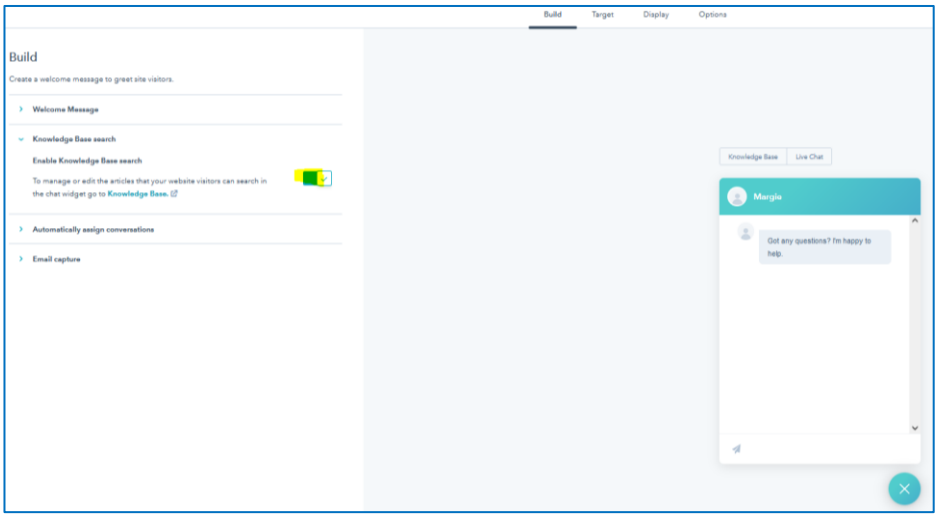


Figure 31. Activating Knowledge Base.

HubBot, short for HubSpot Chatbot, sends a message on what to write as the main topic of the website visitor's concern. For example, if the user types in "policy", the most matching and appropriate article is pulled from the KB library and displayed as a message to the user, with a link to the corresponding published article.

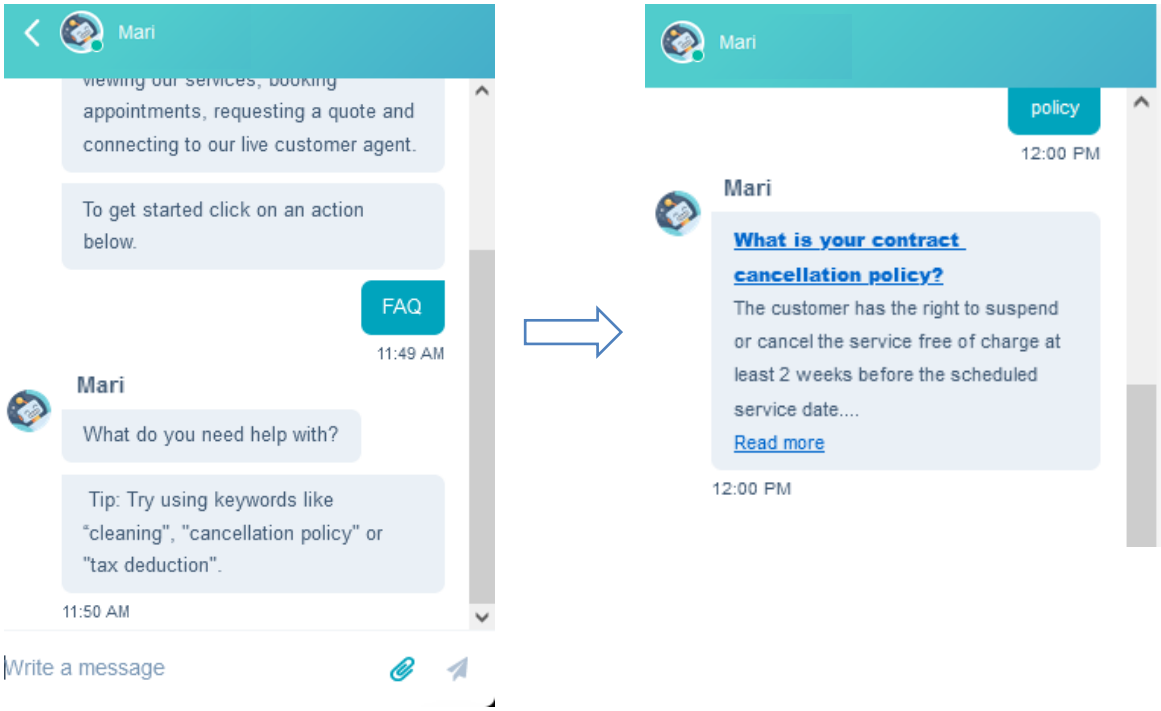


Figure 32. Chatbot scenarios with possible chat stories ("Keyword", on the right side, and "HubBot pulls the article" on the right side).

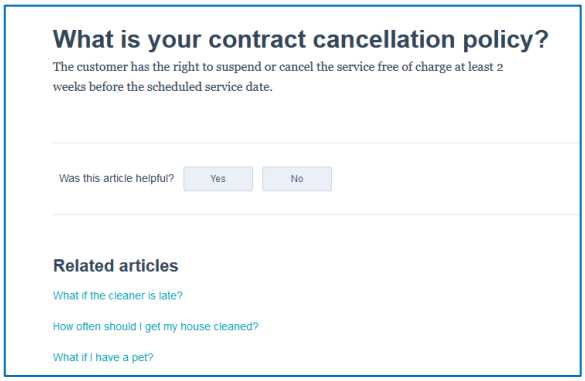


Figure 33. Published article.

As many articles in the Knowledge Base Library can be added as needed, and as much information saved in the library as the company wishes. If the knowledge base is extensive, Mari, the chatbot, can be able to “answer” to any type of questions regarding the service.

5.2.3 Monitoring the Chatbot

At the Monitoring stage, the stakeholders chatbot performance is analyzed for example what is the hot topic in the services list so we can adjust our marketing strategies accordingly. Because the leads generated are automatically collected in the CRM system, they enroll each lead in a defined workflow so they can be sent promotional newsletters in the future. Then in case they find some inconsistencies in the chatbot, we will fix it immediately.

Step 1: Conversation activities

Going through all conversation activities to identify what was successful and what went wrong. The advantage of finding out what is the most purchased service is essential especially if the inquiries did not successfully turn into an order. A marketing strategy can be planned and boost this service in all social media accounts to attract customers. The messages received can be also seasonal, for example during springtime, customers are very keen to maintain their garden for the upcoming summer season. The case company can act ahead and promote yard cleaning on the website or in the chatbot contents.

Step 2: Lead-Generation

All leads generated from the Chatbot are enrolled to a defined workflow and this is depending on their intent during the first interaction. For example, if the lead was interested in home cleaning, she would be then sent a newsletter that was appropriate to her initial intent. The newsletter regarding window cleaning or deep sofa cleaning will be sent to her so she is aware of the service and some promotional discounts to attract her to purchase additional service.

Step 3: Defects found in Production

If there are bugs or defects found by the time the chatbot was deployed. All bugs found in Production are prioritized and addressed immediately. The chatbot needs constant improvement to remain relevant. If there are suggestions coming from the stakeholders and customers, they will be then proposed to the stakeholders and identify which features are doable.

Step 4: Analyze Chatbot Performance

HubSpot has a dashboard to analyze metrics in the Action Completion chat visualization. There is a chart where each of the actions of both are analyzed, based on their completion rate. For example. How many chat interactions were started in a particular date range and how many chat sessions were completed and abandoned. With this data, the case company will have a visibility on how many sessions were successful and how many were failed and were not completed.

5.2.4 Summary of the Initial Proposal

The key stakeholders' inputs were taken into consideration and prioritized for each item based on their importance. Section 5.3.1 showed the actual development of the AI Chatbot in the HubSpot Chatbot platform, and this was the initial version that needed beta testers to perform validation tasks. Every chat transcript was sent to the live agents as a Follow-up transcript email after each chat conversation.

The stages of the chatbot development are shown in Table 5 below.

Table 5. Stages in the chatbot development: summary.

	Stage	*Content of the stage*
1	Planning, step 1	Developing the Chatbot scenarios
2	Planning, step 2	Implementing a Knowledge Base Chatbot in HubSpot
3	Building, Step 1	Assigning a Name and Personalizing a Welcome Greeting
4	Building, Step 2 -3	Assigning if/then branches for quick-replies

5	Building, Step 4	Price Quotation
6	Monitoring, Step 1	Conversation activity
7	Monitoring Step 2	Lead Generation

This initial version of the chatbot building plan developed at this stage needed to go through validation which happens in Section 6 below since the bugs or defects found during the validation will be addressed *prior* to the deployment of the chatbot, version 1.

Next, section 6 reports on the testing results and validation of the developed chatbot.

6 Validation of the Development

This section reports on the results of the validation stage and points to developments to the initial chatbot building plan. At the end of this section, the Final Chatbot building plan and the action plan are presented.

6.1 Overview of the Validation Stage

This section validates the initial chatbot building plan developed in Section 5. First, the key stakeholders were invited to validate the initial chatbot building plan, the features and its limitations were explained transparently beforehand. Additionally, other team members and professional cleaners participated in the validation phase. Second, because chatbot required to be deployed on the case company's website for the other participants to validate it (so, it was deployed). It was decided to activate it within a certain time when participants can access it at the same time (for the first round of texting for 5 hours; for the second round of testing for another 5 hours; and for the third round, for yet another 5 hours). Third, after the testing rounds the internal stakeholders´ comments and feedbacks were collected about testing Mari, the chatbot. The goal of the validation stage was to ensure that Mari works as expected and all elements developed in it do not have any uncertainties.

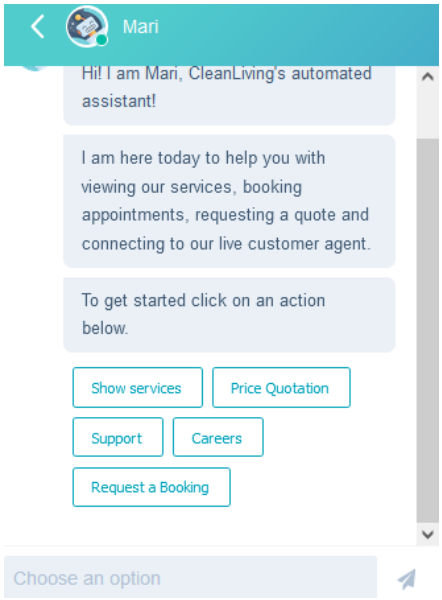


Figure 34. Mari the Chatbot.

The features for the chatbot were suggested by the key stakeholders earlier (in the CSA, Section 3). In the Planning and Building stages, these items summarized in Table 6 below, were implemented into the chatbot. Table 6 also includes a timeline on when they were released (or expected to be deployed) in production.

Table 6. Scope and timeline for the chatbot development, testing, and releases.

	Features	*Version*	*Development (in Section 5)*	*Testing (in Section 6)*	*Release Date*
1	Price Quotation	1.0	May 1 – June 30, 2022	July 1, 2022	Aug 1, 2022
2	Show services				
3	Booking System				
4	Support				
5	Careers				
6	Frequently Asked Questions/Knowledge base	2.0	January 1 – January 31, 2023	Feb 1, 2023	Mar 1, 2023
7	Multilingual (Finnish)				

Earlier in the development stage, together with the key stakeholders, the items were prioritized based on their importance and features that are in Version 1.0 were set as high priority. The timeframe for this project was defined by various factors, time and resource as the development and testing stages involve plenty of time and effort. The release date was about 1 month after the testing, as the key stakeholders and other team members in the case company rigorously tested the AI Chatbot during this time. All bugs or inconsistencies found at this stage were addressed urgently until the final release date.

In addition, having a Knowledge Base functionality in the AI Chatbot required an acquisition fee in HubSpot which required the account owner to upgrade his/her plan into a Sales Hub Professional plan where Knowledge Base functionality was supported. Features in version 2.0 is planned to be built later if the case company considers proceeding with the upgraded plan. On the other hand, the chatbot elements and contents can be translated into Finnish without having the upgraded plan.

Thus, the items listed in Table 6 were grouped into two project sprints which meant that the deliverables and milestones of each version would be reached separately. This project timeline for each sprint was planned together with the key stakeholders and revised once again after the testing stage.

6.2 Developments to the Proposal (collecting feedback, Data 3 and implementing these improvements)

Data Collection 3 concentrated on identifying improvements to the Initial Build in Section 5, what the experts say should be further developed in the Initial chatbot building plan. The key points in the testing results and feedback are as follows.

Table 7. Summary of the testing results and further development suggestions (findings of Data 3) for the Initial proposal.

	Element 1 of the Initial Build identified as faulty in Testing	*Parts commented in Validation*	*Description of the comment/ feedback by experts (in detail)*	*Development to the Initial proposal*
1	Grammatical errors and messages seem to be lengthy	a) Grammar errors in Bot's responses and in the articles	The experts suggested going through each response together and revising the answers in each article as well.	Update the contents and fix grammatical errors in each response and in the articles. Lengthy messages will be shortened.
	UI -issue	Articles in FAQ is not categorized	The full content of an article is not displayed. There was a case when the answers to an article was cut off.	Assign each article to one category for example "FAQ" which lists all the articles under it
2	Incorrect price calculations	Calculations after selecting a property size led to another calculation that is intended for another property size	When the 60-69m2 property size was selected, it showed the price estimate for 85-92m2.	Ensure that each price calculation per property size outputs correct price estimates, update it accordingly.

3	Elements in action-based response do not lead anywhere	Action-based response such as Leave Contact Request action form.	The experts spotted an error in one of the Action-based responses for Leave Contact Request action. They were not led anywhere else, and the chat conversation ended.	Connect the Leave Contact Request form to respective actions, when applicable.

The findings from Data collection 3 including the inputs of the experts/beta testers are discussed in the sub-sections below.

6.2.1 Developments to Element 1 of the Initial Build

There were quite a lot of grammatical errors in the Bot's responses, the CEO noticed that some messages were lengthy and seem to be boring to read. In addition, there are also grammar mistakes in the articles published in the Knowledge Base library. There was also redundant information in the articles, refer to the Figure below.

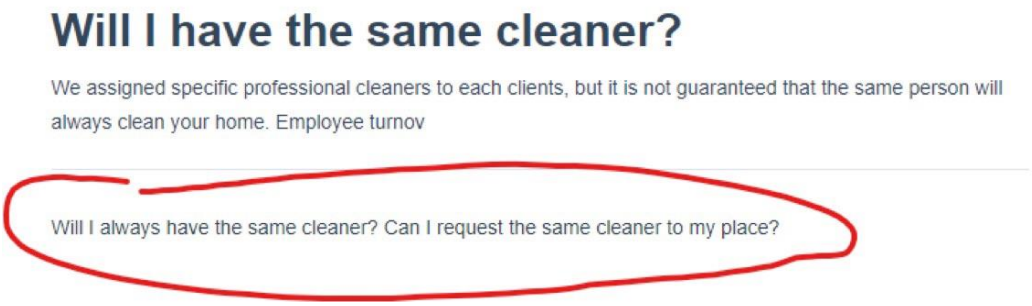


Figure 35. Duplicate article.

These duplicate articles were displayed in the chatbot when the user types the keyword "same cleaner". The first one did not display the full answers and got cut off on the second sentence. On the other hand, the second question got duplicated because this wasn't assigned in the correct category in the first place.

All UI related issues and grammatical errors were corrected with the key stakeholders. They were present or contacted directly while fixing these issues.

6.2.2 Developments to Elements 2 of the Initial Build

This element is set to high-priority and requires immediate fixing because if this is missed in Production, it may give incorrect information to the website visitors that may lead to disappointments later. Each price calculation element were gone thoroughly and ensured that each price estimates action was mapped in the correct property size. The customer service agent volunteered to record the user story done when going through the price quotation elements then assign PASS/FAIL for each estimates shown. It will allows the case company to have a visibility of which element requires fixing for the final development.

6.2.3 Developments to Elements 3 of the Initial Build

One expert tried to proceed through the price quotations until clicking to the “Leave Contact Request” but the action did not lead him anywhere but was sent a confirmation message that his contact information was collected. Figure 36 shows how it was.

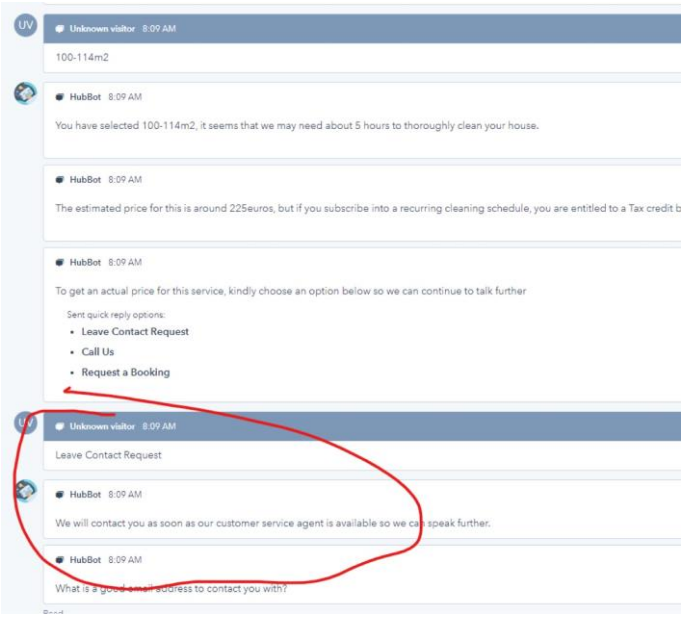


Figure 36. Leave Contact Request, navigational issue.

As seen in Figure 36 above, it seems that the chatbot did not collect the necessary personal information of the user after clicking the “Leave Contact Request”. Ideally, the Leave Contact Request action should ask for the user’s personal details as in the figure shown in Figure 21 in Section 5.2.2. Rather, the user is shown a fallback message. This issue was investigated together to identify the root cause.

6.2.4 Final Developments

After the experts had finished the validation and verification, the chatbot was de-activated for the time-being until all necessary fixes are applied. There's an adequate time allotted for bug fixes before finally deploying the final version of the AI chatbot. The key stakeholders agreed to have a meeting to fix grammatical errors together and go through each article and verify that they are assigned to one category only which is "FAQ".

As the defect in the price quotation feature was evaluated as critical and required extra attention, the sales representative and the customer service agent agreed to take part in finding uncertainties under the price quotation actions and to re-validate this feature once fixed.

For the Leave Contact Request navigation issue, the Managing Director agreed to check all actions mapped to the Leave Contact Request action and to examine what's the underlying issue. Basically, any action-based response connected to the Leave Contact Request must be directed to the correct action element.

6.3 Final proposal

These stages of the chatbot building were used for building the chatbot:

	Stage	*Content of the stage*
1	Planning, step 1	Developing the Chatbot scenarios
2	Planning, step 2	Implementing a Knowledge Base Chatbot in HubSpot
3	Building, Step 1	Assigning a Name and Personalizing a Welcome Greeting
4	Building, Step 2 -3	Assigning if/then branches for quick-replies
5	Building, Step 4	Price Quotation
6	Bug fixes	Developments to Element 1 2 3 which impacted Stage 1-7 in Section 5.2.4
7	Validation round	Another round of validation stage to ensure that the defects are addressed prior to deployment

8	Monitoring, Step 1	Conversation activity
9	Monitoring Step 2	Lead Generation

There was a slight update from the Initial Proposal, Section 5.2.4, as key stakeholders spotted some bugs in the beta version of the chatbot. Ideally, all necessary bug fixes need to be addressed prior to the release of chatbot v1.0. Therefore, the key stakeholders agreed to help with the grammatical and navigational issues and re-test the features on the second round before the deployment. All the inputs in Data Collection 3 are taken into consideration in the final proposal. The Monitoring Stage will occur after the chatbot has been deployed to monitor the website visitor's activity and the lead generated.

In addition, the development of the features for Version 2 is set to start in January 2023, which is beyond the timeframe of this thesis, as there are many factors to consider before these can be implemented.

7 Conclusion

This section contains the summary of this study including the objectives, goals and the Research Method used. The milestones achieved in this study are derived from the findings in the CSA and the research done in the Conceptual Framework.

7.1 Executive Summary

The objective of this study was to transform the current simplified version of chatbot into a smart AI chatbot that can help the case company with lead generation and will take it closer to having an automated sales funnel. At the beginning of the study, the issue within the simplified version of the chatbot was obvious for the key stakeholders. They also felt clearly that a smart AI chatbot can boost the marketing of their business in the digital world. There was an internal decision made that the case company would need a better bot assistant for their customer support.

Before proceeding to development, there were factors that needed to be identified first. This means identifying the issues that they currently face in the chatbot system through conducting the current state anaysis. The data collection for this study included interviews and discussions in the case company and a small-scale questionnaire with the customers. The research method for this study was action research as this study required iterative actions to plan and implement several cycles based on the evaluation done at the previous stage.

The current state analysis helped to identify the issues that the case company faced within the current chatbot system. The identified issues related to a considerable manual interference, limited availability in terms of the response time, and lack of a knowledge base for more informative responses, among other issues. Therefore, the focus areas of this study concentrated on improving the current version of the chatbot in order to implement a knowledge-based feature that can provide relevant answers 24/7 as it can understand the context and intent of the website visitors.

To find relevant guidance the study explored available knowledge on the topics of chatbot building and selected especially HubSpot guidance as best practices to follow when develop the solution. The most relevant elements of the available lnpesklge and best practice were picked up and merged into the conceptual framework that helped to

guide the next steps as for how the chatbot features can be implemented by following the best practices. Since the case company already decided earlier to utilize the HubSpot Chatbot platform as the case company's CRM system, the platform for chatbot building was naturally associated wiht the HubSpot application. It was also a point to get acquainted with and become aware of other chatbot solutions that serve similar functionalities.

During the proposal stage, the first version of the chatbot that was developed. The chatbot scenarios were presented to the key stakeholders to have a visual idea on how the chatbot scenarios flow. On the other hand, the features were considered that were gathered from the needs form stakeholders as inputs from Data Collections 1 and 2. It was then agreed to group these features into two project sprints due to time limitations and lack of resources in terms of actual development. The features specified in Version 1 were developed at the initial solution building stage, Section 5. Later on, the initial version was piloted and tested by the key stakeholders in the production environment and the chatbot was de-activated once they have completed the validation. Their feedback was gathered immediately after, and the action plan for fixing each defect found was determined in Section 6. The key stakeholders gathered in a meeting to resolve the issues together. After that, a round of validation discussions was conducted prior to the release of the final version of the AI chatbot called Mari. The validation discussions with the key stakeholders evaluated the testing results and suggested further improvements to benefit the case company with a better version of the chatbot.

During the testing stage, it was deployed to the case company's website and is currently in use there since then. The chatbot that has been launched helps the customer service agents to respond to multiple inquiries, close deals from the leads generated by the chatbot, and pass their information to the CRM system to assist the customer service agents further, when needed.

7.2 Thesis Evaluation: Objective vs. Outcome

The objective of this study was to transform the current simplified version of chatbot into a smart AI chatbot that can help the case company with lead generation and will take it closer to having an automated sales funnel. The first version of the chatbot was deployed according to the project timeline. Since then, the case company has received inquiries

through the chatbot that help the company to collect qualify leads, as was initially intended when staring this thesis.

The key stakeholders of the company are very satisfied with the results. The customer service agent added that it has boosted her productivity at work as she can focus on other tasks. According to the customer service agent, she now spends about 2 hours in total a day monitoring the chatbot activity. The amount of time spent on monitoring has reduced a lot compared to when the simplified chat system was in use. She goes through the chatbot inbox and follow-up to the customers and take actions. For the meantime, the contents for the Frequently Asked Questions will be added as a sub-page under their company website. In case there is an inquiry or question that has been frequently asked, she can manually copy the information from the page added and paste it to the website visitor.

As a result of the chatbot developed in this thesis, the case company was able to close deals from the generated leads and can see potential benefits in their sales operations if the AI chatbot is fully operational. It has reduced their time monitoring the chatbot activity as it can provide real-time assistance. The feedback from Data Collection 3 had shown a significant impact on the overall functionality of chatbot version 1. We were able to spot major issues and diminish negative issues that the website visitor might see. Once the knowledge base feature is implemented within the chatbot, it will lessen all the manual tasks by the Customer Sales Agent as the chatbot can then handle complex issues or inquiries with no help from their side.

The outcome of this study has given a positive impact on the case company sales and operational level. On the other hand, the thesis researcher herself learned a lot through this journey despite all the challenges she have faced. There were times when giving up seemed to be the only option. It was also difficult to collect data from the customers, so the thesis researcher tried contacting them via phone and email, and many agreed but some declined due to not having extra time to complete the survey. They were also worries that their personal details were going to be shared across other platforms, therefore, the survey form created (Google Forms) purposefully didn't collect any other information from the respondents.

7.3 Closing Words

I independently selected the most suitable topic that could potentially help my professional career growth while boosting sales of our family-run business. Not only because I have been fascinated with how chatbot works which can tremendously impact any business operations. I have also grown an interest how they are implemented in platforms that do not require too much programming.

Moreover, upon attending the Digital Sales and Marketing Automation course offered in Metropolia, I discovered HubSpot's capabilities more in-depth and got more understanding of how it can handle complex functions when implementing a knowledge-based chatbot. The course basically gave me a go-ahead signal that it is possible for a non-programmer professional to build an AI knowledge-based chatbot. Although minimal programming is required for example, when adding simple syntax and code snippets to the platform, this has encouraged me more to take the challenge and continue learning.

In addition, I have tried to look around our competitor's website to check if they have chatbots implemented on their website, but I cannot find one. This means we are at the right time to implement a well-functioning AI chatbot to the case company's website for their competitive advantage.

References

Agarwal (2022). 6 Best Practices For Chatbots. Available at: https://outgrow.co/blog/best-practices-for-chatbots

Alburger, (2022). Chatbots. Chatbot Best Practices: The Ultimate Guide in 2022. Accessed from: https://www.hubtype.com/blog/chatbot-best-practices . (Accessed on May 2022)

Alexander (2002). Resolution Bot explained.Available at: https://www.intercom.com/help/en/articles/2408936-resolution-bot-explained

Andersen, J. P. and Blichfeldt (2006). Research Design: Creating a Wider Audience for Action Research: Learning from Case-Study Research. Journal of Research Practice. Vol. 2, Iss. 1, Article D2.

Case Company (2021). Case Company website. CleanLiving Oy. Available from: http://www.cleanliving.fi (Accessed 01 Jan 2021).

Chatbot (2002). Build, test and refine. Available at: https://www.chatbot.com/

Cornell (2022). ProProfs Chat. 10 Chatbot Best Practices for a Business. Blog. Available at: https://www.proprofschat.com/blog/chatbot-best-practices/ (Accessed 01 Jan 2021).

Costello, P. (2011). Effective Action Research 2nd Edition: Developing Reflective Thinking and Practice, eBook.

Coughlan, P. and Coghlan, D. (2002) "Action research for operations management", International Journal of Operations & Production Management, Vol. 22 Iss. 2, pp.220-240, Available at: https://doi.org/10.1108/01443570210417515 (Accessed 23, Jan 2021)

Dilmegani, C. (2017), Top 12 Benefits of Chatbots in 2020: The Ultimate Guide , AI Multiple. Available from: https://research.aimultiple.com/chatbot-benefits/ (Accessed 05 December 2020)

Haan, M. (2002). 7 Best Chatbots (November 2022). Available at: 7 Best Chatbots (02 November 2022)

Hubspot (2002). Free Chatbot Builder Software. Available at: Free Chatbot Builder Software (01 November 2022)

HubSpot (2002). HubSpot Knowledge Base. Choose your bot actions. Available from : https://knowledge.hubspot.com/conversations/a-guide-to-bot-actions (Accessed 15 September, 2022)

HubSpot (2002). HubSpot Knowledge Base. Create a Live Chat. Available from: https://knowledge.hubspot.com/chatflows/create-a-live-chat#1-build-create-a-welcome-message (Accessed 15 September, 2022)

HubSpot (2002). HubSpot Knowledge Base. Use If/then branches in bots. Available from: https://knowledge.hubspot.com/conversations/use-if-then-branches-with-chatflows (Accessed 15 September, 2022)

Jaramanan (2020). How to Design a Perfect Use Case For Your Chatbot [Chattbot Methodology Part 2/3]Available from : https://blogs.sap.com/2020/05/28/how-to-design-a-perfect-use-case-for-your-chatbot-chatbot-methodology-part-2-3/

Kananen, J. (2013). Design Research (Applied Action Research) as Thesis Research. A practical guide for thesis research. Publications of JAMK University of Applied Sciences, 146.

Kannan, P.V. and Bernoff J. (2019), Does Your Company Really Need a Chatbot? Harvard Business Law. Available from: https://hbr.org/2019/05/does-your-company-really-need-a-chatbot (Accessed 05 December 2020)

Khan, R. and Das A. (2018). Build Better Chatbots: A Complete Guide to Getting Started with Chatbots. Chapter 1, Introduction to Chatbots.

Mack, N., Woodsong, C., McQueeen, K., Guest, G., and Namey, E. (2005). Qualitative Research Methods: A Data Collector's Field Guide. Available at: https://www.fhi360.org/sites/default/files/media/documents/Qualitative%20Research%20Methods%20-%20A%20Data%20Collector%27s%20Field%20Guide.pdf (Accessed 23, Jan 2021)

Merisalo, S. (2018). Developing a Chatbot for Customer Service to Metropolia UAS Student Affairs Office. Master's Thesis.

Mousumi (2021) .11 Best Practices for Building Chatbots. Available at: https://www.kommunicate.io/blog/best-chatbot-practices/

Nguyen Tung Son (2019). Potential effects of chatbot technology on customer support: A case study. Master's Thesis.

Nilsson, N. J. (1998). Artificial Intelligence, What is AI? Chapter 1, eBook.

Pathania, A. and Guzman, I. (2016), Accenture Interactive, Chatbots in Customer Service, pp 3-6. Available from: https://www.accenture.com/t00010101T000000__w__/br-pt/_acnmedia/PDF-45/Accenture-Chatbots-Customer-Service.pdf (Accessed 05 December 2020)

Ramasubramanian, S. and Shivam (2019). Building an Enterprise Chatbot: Work with Protected Enterprise Data Using Open Source Frameworks. Chapter 3, Chatbot Development Essentials. (Accessed on 12, February 2021)

Roldos, I. (2020). "NLP, AI, and Machine Learning: What's The Difference?" Blog. Available at: https://monkeylearn.com/blog/nlp-ai/ (Accessed 01, Feb 2021)

Salesforce (2002). Einstein for Service: AI-Powered Customer Service. Available at: https://www.salesforce.com/content/dam/web/en_us/www/documents/datasheets/einstein-for-service-data-sheet.pdf

Shewan (2022). 10 of the Most Innovative Chatbots on the Web. Available at: https://www.wordstream.com/blog/ws/chatbots

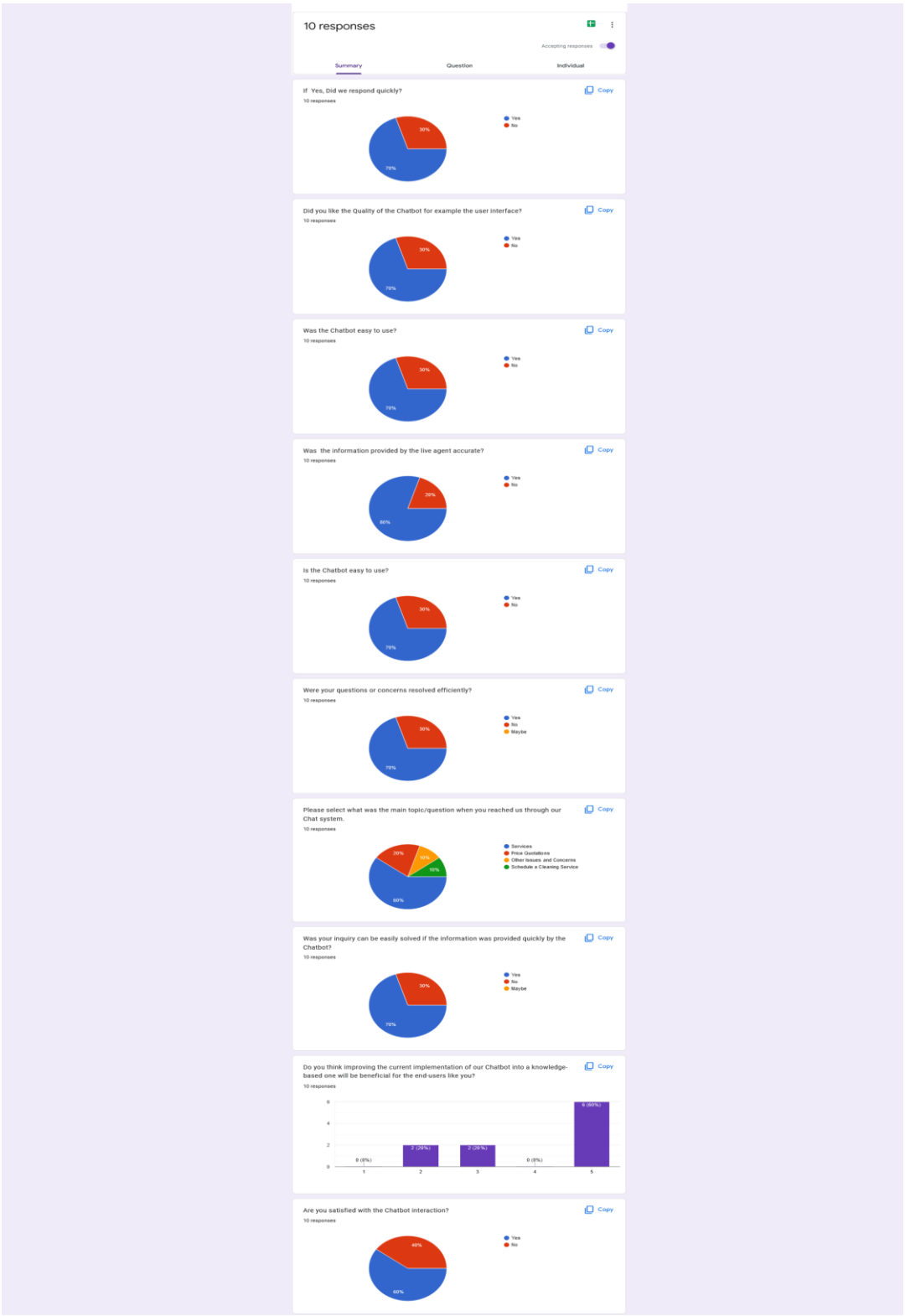
Vishnoi, L. (2020), Acquire, 10 Chatbot Benefits That Can Improve Your Business. Available at: https://acquire.io/blog/chatbot-benefits-for-business/ (Accessed 05 December 2020)

Vishnoi, L. (2021). “Chatbot vs. Live Chat: Which is Winning the Customer Service Game and Why?” Available at: https://acquire.io/blog/chatbot-vs-live-chat/ .(Accessed 01, Feb 2021)

Wordpress (2002) . WP-Chatbot for Messenger Plugin. Available at: WP-Chatbot for Messenger.

Zaboj (2022). How to build your first chatbot. Available at: https://www.chatbot.com/help/build-your-chatbot/how-to-build-your-chatbot/#how-to-add-a-chatbot-to-your-website

Appendix 1: CSA Results – External Customers



Appendix 2: CSA Results – Internal Stakeholders