A new model for chatbot implementation in organisations

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Abstract

Chatbots (sometimes just called “bots”) are the subject of much corporate and public interest today. Many enterprises are looking to get started with chatbot development initiatives to improve communication efficiency, as well as reduce operating costs. In recent years, with the development of new technology, chatbots have become more accessible to companies. Leading IT vendors and many smaller technology companies offer a variety of platforms and solutions for quickly building chatbots, but the process of planning, launching and operating bots is still associated with significant risks. This research explores the challenges inherent in chatbot integration projects and identifies key operational factors for successful chatbot projects. Different technology adoption and project management models are examined, analysed and applied in the context of chatbot implementation and, based on an in-depth case study, a new chatbot operational model is formulated to aid the manageability of chatbot implementation in other similar environments.

The research philosophy is interpretivist and the research centres on a case study of a chatbot implementation in one of the world's leading steel producers (presented in this research as an alias - ESteelCo). ESteelCo’s global strategy is based on human capital, health and safety, new technology and strong customer focus. The company’s customer orientation includes the ability to respond to the growing needs of steel consumers and investment in customer relationships. This prompted the company to develop a chatbot that can automate some routines and provide a new, modern service that is available 24/7.

The ESteelCo case study provided an in-depth inquiry into the complexity of the chatbot implementation phenomenon and facilitated the creation of new knowledge about it. Semi-structured interviews and participant observation provided diverse and complementary research data from which an operational model for chatbot implementation was developed and verified.

The model designed in this study can serve as a supportive practical guide for researchers and specialists in the integration of virtual assistants. It is flexible and applicable in a wide range of business contexts. It links strategic business goals with execution steps, and is particularly effective for teams with no experience of chatbot implementation, reducing uncertainty and managing decisions and risks throughout the project lifecycle, thereby increasing the likelihood of project success.

Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas. Any views expressed in the thesis are those of the author and in no way represent those of the University.

Signed:_____ Date: __10/06/2024___

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1 Introduction

1.1 The rise of the chatbot technology

The Cambridge Dictionary defines a chatbot as a "computer program designed to have a conversation with a human being, especially over the internet" (Cambridge Dictionary, n.d). In practice, modern chatbot platforms vary in behaviour and complexity, and can be delivered as standalone applications or as a service on top of another powerful platform. They usually interact with users in a simple text-based dialog format. However, more sophisticated solutions can generate voice responses or enable communication with virtual characters that can communicate and express emotions in virtual environments, almost like humans.

The chatbot also refers to a broader term – "conversational interface" or "conversational user interface" – a technology that enables communication between people and information systems (IS) using a human language (McTear et al., 2016). While chatbots are usually associated with a text-based communication in a messenger or chat window (Jurafsky et al., 2010), conversational interfaces can also include voice assistants integrated in smart or wearable devices, smartphones, social robots, autonomous vehicles, and other devices. Other popular terms that also refer to the chatbot technology include: artificial intelligence assistant (Nichol, 2020), virtual assistant (Gartner Information Technology Glossary, 2020; Hoy, 2018; Mutchler, 2019), dialog or conversational agent (Jurafsky et al., 2010; Klüwer, 2011; McTear, 2020), dialog system (Jurafsky et al., 2010; Klüwer, 2011; McTear, 2020), simply "bot", and others.

The origin of chatbots goes back to 1950, when Alan Turing proposed a test to assess a machine's ability to demonstrate intelligent behaviour, and therefore be judged as a human (Turing, 1950). His publication caused great philosophical debates about whether machines can think, and if the test was applicable to measure intelligence. Later, in 1966, Weizenbaum created a computer program named ELIZA, a virtual character that played the role of a Rogerian therapist (Hingston, 2009). Many people

experienced emotional conversations with the program and described its behaviour as human-like. Although it used a simple pattern-matching structure, and did not recognize context, ELIZA's ability to pass the Turing test was surprisingly clear-cut (Rhee, 2010).

Sculley et al. (1987) described a theoretical device called Knowledge Navigator. They also published a concept video, which demonstrates how Knowledge Navigator could assist a professor in checking incoming mails, making appointments, finding publications, etc. Many of these ideas were implemented in a real device much later in 2010, when Apple released its Siri assistant, then integrated it into their iOS operating system for mobile devices in 2011. A little later, Microsoft introduced their Cortana assistant, Amazon launched smart home speakers powered by Alexa, and Google embedded its own assistant into the Android operation system.

The complexity of chatbots is growing each year, and the number of successful applications is also increasing. AI powered applications can potentially change whole industries, completely transforming the way people use traditional services. Julie, a customer service bot launched in 2001 by the national railway corporation Amtrak (US), can book reservations, provide station and route information, answer questions about timetables, and process other customer requests. In 2016 the robot processed about 20 million calls and could completely solve 25% of user problems. The implementation of Julie also resulted in an annual saving of $1 million in email costs (Nuance, 2016).

Over the past decade, the success of the widespread use of chatbots has been continuously linked to advances in the development of AI technology. Virtual assistants may vary in functionality, and aim to solve different problems, they all leverage modern AI technology and natural language processing (NLP) algorithms (Hoy, 2018). Approximately in 2014, new approaches based on non-linear neural networks began to be used more often in practice. The use of recurrent neural networks (RNNs) demonstrated significant success in solving typical NLP problems (Goldberg, 2017). The development of NLP algorithms has had an impact on the development of businesses.

The research made by Bernardini et al. (2018) shows a significant increase in interest in AI from organisations due to the competitive environment in the global market and rapidly increasing hardware performance which makes the new technology more accessible each day. In 2018 Devlin et al. (2018) introduced a BERT (Bidirectional Encoder Representations from Transformers) model for solving a wide range of NLP tasks that dramatically improved performance of the conversational interfaces. For chatbot developers, BERT provided rich opportunities to solve applied NLP tasks typical of most chatbots: user intent recognition, question answering, classification (Horev, 2018). The subsequent improvement of LLMs (Large Language Models) and text generative models based on their principles have had a significant impact on the development of chatbots. The latest and most significant development in the field of NLP is the creation of the GPT (Generative Pre-trained Transformer) model by OpenAI in 2018. It shows excellent results in tasks involving the processing of human language text. The GPT model is trained on a wide range of open text data, including Wikipedia, and is able to generate coherent text of almost indistinguishable quality from human-written text (Floridi et al., 2020). GPT-4, released in March 2023, is the latest and most advanced version of the GPT family of models to date. It is a multimodal model that works not only with textual information, but also with images, and has pioneering abilities to handle a wide range of real-world tasks performed by humans. Benchmarks show that the model scores higher than the average human on many popular standardised exams in maths, physics, chemistry, statistics, biology and other fields (GPT-4, 2023).

Today, virtual assistants leverage AI technology to help customers book a flight, get a quick answer on a simple question, or resolve complex customer queries. E-Commerce brands enable placing orders via a chat interface instead of a website or mobile app. Marketing and sales personnel benefit from using bots by providing immediate responses to clients' inquiries, quickly engaging with potential customers, collecting data and pushing users through the marketing funnel. Human resource (HR)

departments automate their recruiting process using virtual agents, automate internal routines responding to frequent employee requests addressed to HR. They help establish a user-friendly learning process in an enterprise chat instead of a separated Learning Management System (LMS). Chatbots improve organizations in general by handling internal business communication and automating different sorts of repetitive question-answer tasks. In addition, they facilitate employees in scheduling meetings, task management, idea management, and offer scenarios for vacation planning. Finally, Business Intelligence (BI) bots provide critical business metrics and reports to management on request, through a conversational interface.

1.2 Research aim and objectives

Chatbots are very attractive for businesses due to their conversational nature. They provide people with an interface to communicate with information systems, in a way that is more instinctive for human beings, through dialog (Williams, 2018). Despite the rapid development of technology in this area, the increasing capabilities of AI algorithms and the growing number of successful real-world applications, chatbot implementation projects face a number of difficulties. The expectation of quick and immediate success that many companies had in the middle of the last decade was soon replaced by a more sceptical attitude towards the potential of virtual assistants (CB Insights, 2021). Practical experience has shown that chatbots cannot be used effectively in all situations, creating a high-quality service requires significant investment, the technological complexity and unpredictability of the projects present additional difficulties for the teams implementing them. The lack of practical experience of many teams, as well as the relatively low amount of theoretical knowledge and practical recommendations in the professional community, is an additional challenge (Fach et al., 2019; Gwendal et al., 2020; Janssen et al., 2021; Kaushal et al., 2022; Srinivasan et al., 2018). To address these and many other challenges, research is needed to identify the specifics of chatbot projects and produce new knowledge that will help companies facilitate the process of implementing chatbots.

This research aims to study the challenges inherent in chatbot integration projects and develop solutions which can aid the manageability of chatbot implementation. A chatbot is understood as a virtual assistant that provides a service through a text-based dialogue interface. Aspects of creating voice assistants, smart devices and other forms of using dialogue interfaces are not considered in this study. The new model formulated in this study aims to support IT managers from large and medium-sized companies, IT integrators and other industry practitioners and specialists involved in the creation and deployment of chatbots. The purpose is not to study the specifics of the implementation of virtual assistants in particular industries. On the contrary, the research identifies common patterns and rules that can be useful for a wide range of organisations whose activities are related to customer service, which can be transformed into a client-chatbot interaction, benefiting both the company and the client. The creation of a broad span of knowledge of the problems related to chatbot projects and the approaches to solving them, regardless of industry, country and culture, is the priority of this study.

The research objectives (ROs) of this study are:

RO1: To investigate and assess the main challenges which companies face when implementing chatbot projects.

RO2: To identify the critical success factors and strategic options for successful chatbot implementation.

RO3: To develop and validate a conceptual framework and/or operational model to support the chatbot implementation process and deliver expected chatbot project outcomes.

1.3 Research methodology: the ESteelCo case study

This research is based on the interpretivist paradigm to discover complexity of social phenomena and develop new knowledge through observing and understanding social settings. In business research, this approach is often used in researching organizational processes by considering the varied experiences of employees in different roles

(Saunders et al., 2016). The chosen paradigm provides an appropriate research structure and methods for applying qualitative methods of analysis and in-depth investigation of the chatbot implementation to address the ROs. Diversity of opinions and valuable expert opinions are the main interest for the researcher in terms of generating knowledge and creating new theory.

The choice of interpretivism is motivated by the intention to use a qualitative approach and related research strategies. The use of the case study strategy is considered the most appropriate, taking into account the research aim and researcher's capabilities, as it allows the necessary research data to be obtained in the process of participating in the chatbot implementation project at ESteelCo.

This use of a case study strategy for this research became possible due to cooperation with ESteelCo and its marketing team. ESteelCo is one of the leading steel producers in the world, which operates in Russia, the USA, Canada and other countries. The company offers its customers steel products such as rails, beams, construction steel, and others for attractive prices due to the vertical integration and low-cost production along the value chain. The global strategy is based on human capital, health and safety, new technology, and strong customer focus. The latter includes the ability to respond to the growing needs of steel consumers and investment into relationships with the clients.

New technologies have enabled ESteelCo to establish a strong link with its customers and improve the service quality. “Enterprise Feedback Management” (EFM) is an internal project, which aims to collect, process and analyse customer feedback in the most efficient and acceptable way for the customers. This service informs customers about their order status and offers a convenient way to ask a question, make a claim, provide feedback or raise any other problem with the business. Since messengers (i.e., messaging apps) play a significant role in our private and professional life, ESteelCo customers already use them as a preferable way to contact the company business representatives.

EFM supports this pre-existing behaviour, and employs popular messengers (WhatsApp, Telegram) as the main communication channel for clients. In addition, the company offers their clients a chatbot service, which automates some routines and offers a new modern way to solve their problems. The core ESteelCo customers are large distributors, production companies, and real estate developers, who frequently contact their account managers while closing a deal or during shipment. Inability to resolve many issues quickly, especially in cases when customers and managers are located in different time zones, affects the sales process and negatively impacts the business. With the chatbot launch, the marketing team aimed to improve the quality of the service and defined the main project objective - provide an immediate response to the clients.

The project team for the implementation of the new EFM service and the chatbot, as part of it, consists of 9 people, including the researcher himself, who was involved in the project as part-time analyst and researcher. More detailed information about the EFM project, its characteristics, objectives, and the research context is provided in section 5.2.

1.4 Summary and thesis structure

Despite the rapid development of technology for creating virtual assistants and the growing interest in this topic from the business community, the practical implementation of a chatbot in organisations is a very challenging process. This study aims to explore the challenges associated with implementing a chatbot, identify the success factors that determine successful chatbot implementation, and create an operating model that will help teams overcome the challenges and facilitate the successful implementation and adoption of chatbots in practice.

Following this introduction, chapter 2 provides an overview of academic publications and company reports that are relevant to this study. It outlines the challenges associated with the chatbot implementation process and introduces the Critical Success Factors (CSS) methodology, listing the key factors influencing chatbot project success. It

also considers important technology adoption frameworks, change management models and software development methodologies. The set of different theoretical approaches presented helps to provide a basis which is further used to create a conceptual framework which is described in detail in Chapter 3. Chapter 4 is focused on research methodology and design. It explains the researcher's epistemological position, describes the chosen research approach and method. It also justifies the use of the case study strategy and describes selected data collection techniques and data analysis procedures. Chapter 5 summarizes the research findings, which include the results of the interviews with 15 respondents and the observations findings. The analysis and interpretation of the findings used to meet the ROs are in Chapter 6. This chapter addresses each of the ROs and sets out the discussion around them. The final chapter 7 summarises the results of this study and provides comprehensive information in relation to the ROs. Contribution of this study to theory and the potential benefits for companies as well as the limitations of this study are presented. Finally, the future of AI technology and virtual assistants, based on the researcher's experience and new insights gained during this study is discussed.

2 Literature review

2.1 Introduction

This literature review chapter begins with an introduction section 2.1, followed by a section 2.2 with an overview of the evolution of chatbots and description of various classification approaches. Section 2.3 then examines the problems and difficulties that client companies and their vendors face when implementing projects at various stages. Section 2.4 then discusses how to define project success, how to measure that success, and how to use a critical success factor approach as a way of achieving project goals. It raises the question of why more and more users prefer to communicate with a robot rather than a company representative or solve their problem on their own using the website. This section also observes the experience of experts and practitioners in the field of chatbot development, AI application, and project management. This data is further used in the research to determine the critical success factors in chatbot projects and serves as the basis for creating the provisional conceptual framework for the primary research. Section 2.5 reviews the models and frameworks used by researchers and practitioners to adapt new technologies and manage software development projects. Next, section 2.6 examines strategic and management methods that can be applied to address the complexity of the chatbot development projects. Finally, section 2.7 provides the summary of the literature review chapter.

The literature review presented in this chapter is based on publications located by using the University of Gloucestershire's electronic repository database, which includes access to many popular global repositories such as WorldCat, SAGE Journals, Springer and many others. Printed books and journals held in the University Library are also used. In addition, the challenges and critical success factors of chatbot implementation were identified using publicly available reports on company websites. These companies are represented by technology leaders (IBM, Microsoft, Google, SalesForce and others), leading consulting firms (McKinsey, KPMG, Deloitte, Accenture and others) and niche

software vendors or service providers (RASA, ContactBabel, Nuance and others). To search for publications on company websites, Google search is used, using general search queries that include relevant phrases such as "chatbot implementation challenges", "success factors for chatbot projects" and their variations using synonyms. Searches containing the names of the companies' brands are also used, for example "chatbot implementation challenges BRANDNAME", where BRANDNAME is the name of the above companies.

2.2 Evolution of chatbots and their characteristics

2.2.1 Evolution landmarks

The first generation of chatbots used a simple response approach, and their behaviour was prescribed in a question to answer mapping table, or another similar format. Like ELIZA (Weizenbaum, 1966) they automated some specific routines, could react on predefined key phrases but could not effectively process naturally generated phrases by humans unless those were explicitly listed in the chatbot's dictionary. The next evolution of chatbots leveraged AI and natural language understanding (NLU) algorithms to process user inputs more effectively and identify their intents, solve speech recognition problems, and synthesize speech. Many modern chatbots integrate unsupervised learning algorithms to enable themselves to learn from the existing knowledge base. Also, they adjust their behaviour and improve performance, processing positive or negative feedback from users, or signals from external systems.

Sengupta et al. (2017) set out five levels of the chatbot evolution, which start with the simplest solutions that have been used for more than a decade, ending with futuristic description of complex fully autonomous intelligent systems that can solve almost any user task. A similar classification is proposed by Weidauer (2018), who also identifies five steps in the development of chatbot capabilities in the past, present, and how their intelligence will improve in the near future. Level 1 chatbots are simple scripted programs which can react on users' requests by matching keywords and searching

relevant answer in a knowledge database. The next level 2 presented by AI powered assistants which can extract meaning from a wide variety of phrases generated by humans. They enable a simple conversation with a user, may ask additional questions, and follow relatively strict predefined dialog scenario from the beginning to the end. This is the level of development that the bots have reached in most of companies which successfully use them in practice (Weidauer, 2018). Level 3 assistants support more advanced dialog scenarios and able to understand dialog's context. For example, when a user asks, "I want to renew my insurance", the bot identifies the user, analyses his or her previous contract details in the company's customer relationship management (CRM) system and provides a personalised offer which matches the user's property characteristics. The 4th level is presented by intelligent advisors which can understand the user's specific problems and provide not only a personalised offer but also advise, for example, how to optimise expenses based on a comprehensive analysis of the user's profile. Level 5 is associated with even more sophisticated behaviour, complete knowledge about users, application of the personalised problem-solving approach, and ability to execute many business processes autonomously (Weidauer, 2018).

Likewise, Bansal et al. (2019) identify three evolution stages that exist in present and are very similar to those mentioned by Sengupta et al. (2017), Weidauer (2018). However, they consider the evolution of modern chatbots in terms of their integration complexity and the effort required for their implementation. At the basic level chatbots can support a dialog, answer frequently asked questions (FAQs), may have simple integrations with other IS, and process user feedback. Usually, they are quite simple and automate very limited number of user scenarios. Intermediate level chatbots are better integrated with a company's IS, offer users personalized service and process wider range of their requests. The advanced bots provide a comprehensive service that leverages AI achievements and solves a largest number of user tasks, including transactional ones (Bansal et al., 2019).

Currently, the most advanced services, which operate in companies now, can be assigned to the third level, according to their complexity and features. Chatbots at this level can understand users' intentions extracted from speech or messages in a natural human language. They also can remember what the user said in the past, adjust their behaviour according to the existing context, can access user profile data or transaction history to prepare a proper response. It is seen that the development of bots at level 4 and 5 in the next 5-10 years will no longer be determined by new breakthroughs in the field of AI and NLP but the ability of companies to solve integration and organizational problems. In order to develop a personalized approach of bots and their ability to act as smart personal assistants, it will be necessary to organize data exchange between multiple systems both within the company and interaction between companies.

By contrast, many authors argue that despite all the novelty and achievements in the development of AI algorithms, virtual assistants are still very limited in their ability to communicate with humans and understand the context when the next step depends not only on the previous one, but on the whole sequence of previous steps or even earlier dialog sessions (Adiwardana et al., 2020; Christensen et al., 2019). In addition, Caldarini et al. (2022) mention a noticeable gap between the solutions applied by companies in practice and the results demonstrated by scientific organisations. To close this gap more flexible, powerful and lightweight business specific models will be required.

2.2.2 Chatbot classification and usage

Chatbots can be categorized in open- or closed-domain systems. Open-domain chatbots are systems that enable a conversation on almost any topic without specialising in a particular area. Usually, such bots are created for research purposes, demonstrate the capabilities of the most modern algorithms and computing systems, and rarely solve a particular applied problem (Mutchler, 2019; Symbl, 2020). Facebook's Blender and Google's Meena, both published in 2020, are the most typical examples of state-of-the-art open-domain dialog agents. They use novel models with billions of parameters, which are trained on extremely large datasets, and enable these bots to offer

outstanding conversational experiences when chatting with humans (Yao, 2021). However, this technology requires many resources and is only accessible for large technology leading companies or scientific organisations. Another problem described by Caldarini at al. (2022) is that open-domain bots are not effective in solving narrowly focused dialogue tasks in a certain area and unlikely can be applied by companies to automate business specific routines. Businesses are limited in their computational resources and access to large datasets, have little experience in dialog model training, and, therefore, clearly lacking in pretrained their domain specific language models, while researchers focus on improving their conversational models of open-domain bots which often fail to understand industry specific content.

In contrast to the complexity and difficult availability of open-domain dialog systems for companies, closed-domain chatbots are designed to solve a specific business problem or automate a certain process. Gao et al. (2018) also name these bots task-oriented dialogue systems because they are especially efficient in automating repetitive procedures, which previously were done by humans, like customer support or simple transactional operations. Symbl (2020) argues that that such bots are popular and successfully applied in many industries due to the dramatically shorter time to market but it is difficult to generalize models trained in a specific area and apply them in another context. Ease of use and narrow specialization has its negative sides, which Larson et al. (2019) point out. Task-oriented bots support conversation well when a user strictly follows a pre-defined scenario. If a user deviates from the planned path, asks a question which does not supported by the system, or simply makes a spelling mistake, the bot falls into a state of uncertainty, and in these cases, human support is needed.

Chatbots also could be described as retrieval or generative depending on a mechanism how they answer to a user request. The first ones are based on their ability to search and extract relevant answer from an available data storage. The second, generation-based systems are more complex and employ algorithms based on recurrent neural networks (RNNs) to develop new meaningful phrases (Song at al., 2016). In addition to

the types of categorisation listed, the Adamopoulou et al. (2020) offer further options, which are shown in Figure 1. Chatbots can be grouped according to the type of service provided and its focus, goals, method of generating a response, the need for a human operator to participate in the dialogue, the method of commercial distribution, and the channel through which the bot provides its service.

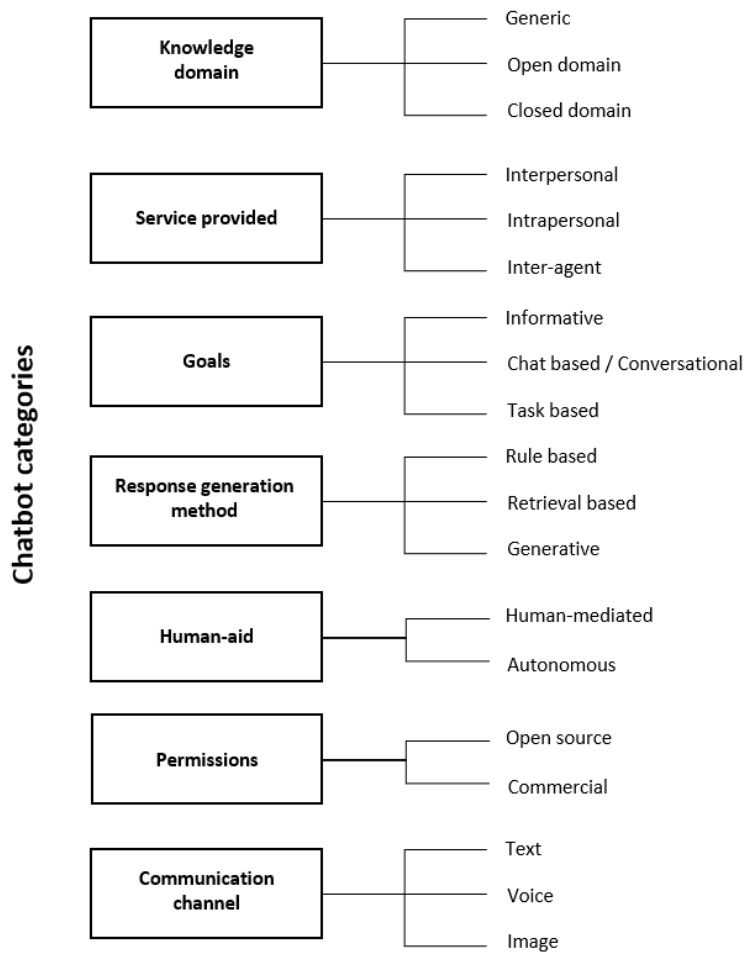


Figure 1. Chatbot classification (Adamopoulou et al., 2020)

This section lists only the most common types of bot classification, however, there are many more types can be found in various researcher publications. Classification can also be based on the technological approaches used, areas of application, complexity of the solution, and other criteria. Luo et al. (2021) point out significant drawbacks and gaps in

the known classification approaches and their inconsistency with the whole variety of solutions used in practice.

Chatbots are most widely used in interaction with the client at different stages of service. They replace humans where it is relatively easy to do this – searching information and providing a quick response, customer support, performing simple transactional operations. Srinivasan et al. (2018) name customer service, sales and marketing, and customer relationship management as the most common business areas where companies implement or plan to use virtual assistants. According to Grand View Research (2021), retail and E-Commerce, Healthcare, Banking, financial services and insurance (BFSI) are the most popular industry domains where companies benefit from chatbot applications. Popularity of chatbots in retail and healthcare industries is supported by Mordor Intelligence (2019) report. Utilities, entertainment and media, travel, and education are also frequently mentioned industry domains which successfully leverage virtual assistants to automate their service routines (Grand View Research, 2021; Mordor Intelligence, 2019; Nair, 2022; Yuen, 2022).

Despite the widespread use of chatbots and a large number of successful examples, in practice, users regularly fall into a situation when a chatbot fails solve their problem. The reasons may be different: the bot may not understand the user's intent or question, the bot cannot obtain the required information due to lack of access to the necessary data, the situation is too complex for AI, the action requires rights or authorisation that only the employee has, and many others. Blended communication approach or sometimes called blended AI is used by many companies to provide high quality service and continuous customer journey. It takes advantage of AI to process large amounts of data quickly to provide almost immediate response and ability of humans to treat customers individually and resolve complex issues. As AI is not perfect, humans are still better able to deal with clients' emotions, natural language, and conversation context (Krayewski, 2022).

Some humans are still preferring to talk to other humans and may find chatbot service irritative. Calabrio's (2018) study shows that 74% of respondents demonstrate better loyalty when they talk to a human agent when they need support. To exclude people's judgement about the current level of development of chatbots and possible negative experience ContactBabel (2021) asked nearly 1000 UK customers whether they prefer to be served by a human assistant or robot in case both ways require them identical effort and time spent on completing their task. The findings show that the number of users who prefer to communicate with a robot or do not see a fundamental difference between a robot and a person is 39% comparing to the 58% of those who still prefer live communication with a person (Figure 2). Such a positive result in this formulation of the question demonstrates a high level of general readiness of a large group of users for a completely autonomous service that excludes a person, but to meet their expectations, further development of technologies and the creation of solutions are required in which chatbots will be offer high quality intelligent service, which is equal to those provided by humans, including processing of complex requests.

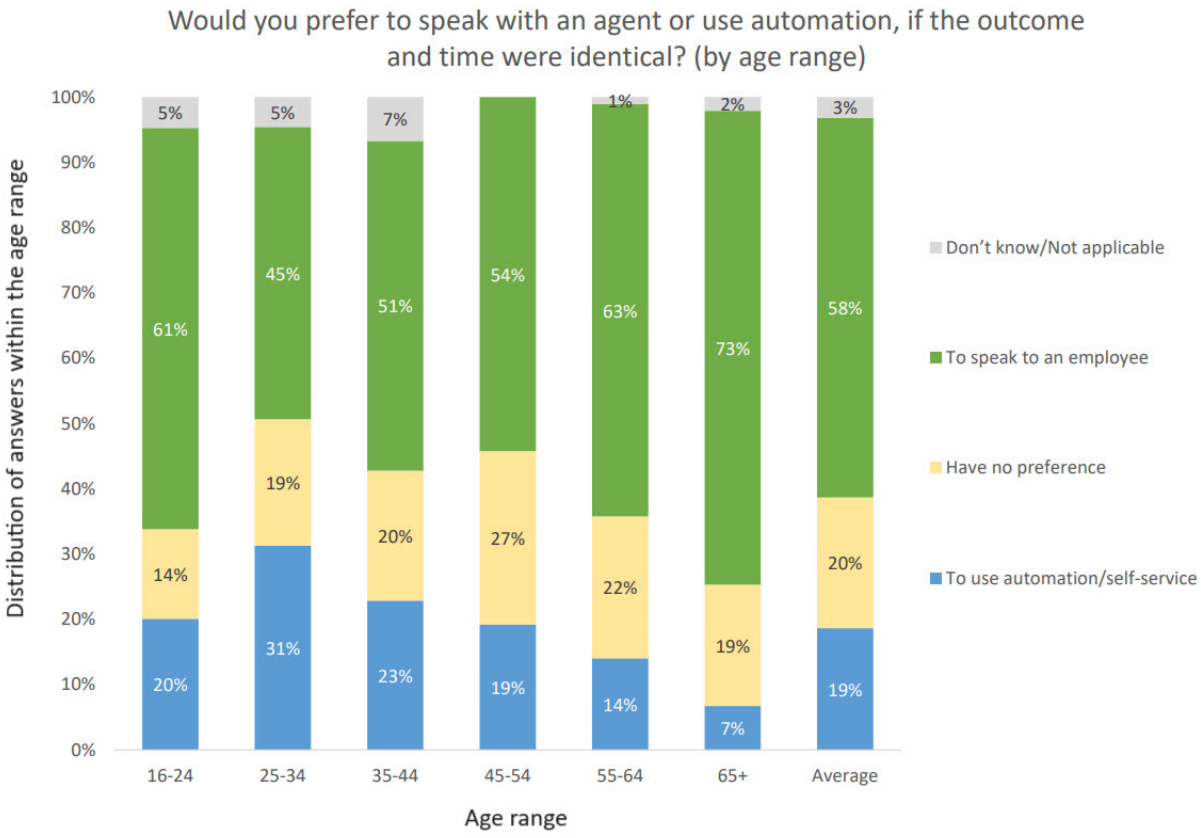


Figure 2. Clients' preference to speak with a human agent vs robot (ContactBabel, 2021)

2.2.3 Notable platforms and vendors

Many companies are now looking for AI-powered solutions that can offer them intelligent tools to interact with their customers. Customers' behaviour in social networks, transaction history or recent communication with a brand should be aggregated in digital profiles. Data accessibility, fluency, and consistency in this case are crucial and require cross-functional collaboration of sales, marketing, customer service and other teams within organizations (Oracle, 2016). Leading technology companies, like Google, IBM, Microsoft, and many others, support the chatbot boom and offer powerful cloud solutions that are aimed to help their customers. Their product descriptions introduce various AI-powered features and promise quick deployment and intelligent bot behaviour that solves actual business problems. Ease of connection to

distribution platforms and popular instant messengers is the essential feature that makes quick time to market for these products feasible (Lebeuf et al., 2018).

Revang et al. (2022) published the first Gartner Magic Quadrant for Enterprise Conversational AI Platforms which focuses on the needs of large companies and names leading platforms for solving their typical conversation automation tasks. A year later, Elliot et al. (2023) published a new version of the study (Figure 3).

Figure 3. Gartner Magic Quadrant for Enterprise Conversational AI Platforms (Elliot et al., 2023)

Kore.ai, Amelia, IBM Watson, OneReach.ai, Cognigy, Avaamo, Google, and Omelia are the top leading platforms from the right-top corner of the Gartner Magic Quadrant. The vendors of most of these platforms offer a variety of platform and data storage deployment solutions. Google Dialogflow and Omilia only offer cloud-based solutions, which is their limitation. By deploying the chatbot in the cloud and using the SaaS

model, implementation time can be significantly reduced, operations can be simplified, and the service can be flexibly scaled. When choosing a cloud platform, organisations also need to consider the location of the servers. This affects not only the speed of data access and cost, but also issues such as data protection laws (Datacenters, 2023). On-premises deployments, on the other hand, require the creation of the necessary server infrastructure within the organisation using the chatbot. This is a more expensive option, but for many companies it is preferable from an information security perspective, as it allows the company to control their servers and use of its customers' data. The leaders demonstrate the largest amount of successful chatbot integrations in many industries for solving various business problems in multiple countries. Although, they are recommended to be the first candidates to consider in large enterprises, companies should not limit their choice because the vendors from the niche players might be more suitable if their characteristics such as set of features, platform integration capabilities, language, technology used, or focus on a specific industry or domain may closely match the exact customer requirements (Elliot et al., 2023). For instance, Boots.ai offers intuitive no-code dialog design approach, ability to organise various bots in a virtual agent network and maintains up to 10 thousand intents with a high-resolution rate (Boost.ai, n.d.; Elliot et al., 2023). Another example is Aisera, which specialises in developing niche solutions for IT helpdesk, HR and marketing. The platform has pre-built integrations with many popular helpdesk ticket services, which can save significant resources and time. (Elliot et al., 2023).

The list of notable and widely adopted platforms is not limited to the Gartner report. Davydova (2017) considers the 25 most popular platforms, comparing their technical, language, licensing, and other characteristics. Some players from the Gartner report appear in this list but a major part of the platforms is different. Ahern (2023) presents his list of 44 chatbot platforms to demonstrate the variety of vendors by comparing their products' prices, type, and distribution platform. Dilmegani (2022) argues that companies must consider their budget, availability of programming skills, and required

functionality to decide whether to buy or build a chatbot and compares more than 60 vendors gathered into two categories. First, self-service providers, which are suitable for companies with programming skills to develop a chatbot inhouse using a cloud platform. Second, is a list of vendors which use their own technology or offer consulting service integrating popular platforms and customizing them according to customer's needs. As of early 2022, chatbot.org (2022) has over 1,360 real chatbot services that are being used by many companies around the world for a variety of tasks. Many review articles and publications that compare the characteristics of chatbot vendors indicate that this market is growing very quickly at the moment and that it is highly fragmented. While technology leaders are developing universal platforms to solve a wide range of tasks of large companies, smaller players are focused on creating specialized solutions for a particular industry or offering unique features of their product that their customers may especially demand. For instance, Chatfuel, an extremely popular service which was used by businesses to create more than 360,000 chatbots, offers an effortless way to setup and launch a chatbot without programming and distribute it specially on Facebook (Geyser, 2023). DeepPavlov (n.d.) is an open-source conversational framework for creating dialog systems by skilled teams, SAP Conversational AI enables the building of services which can be deeply integrated with SAP systems (SAP, n.d.), Einstein is a built-in smart assistant for Salesforce CRM system (Salesforce, n.d.), and there are more examples.

ChatGPT and Gemini, the leading LLMs, are not usually considered conversational AI platforms and are therefore not included in the above reports. In its research, Gartner (Elliot et al., 2023) includes software platforms that provide a comprehensive set of tools needed to run bots, including connectors to popular messengers and software services, reporting and error handling capabilities, and many others. These platforms enable organisations to create, manage and maintain a variety of conversational automation use cases. Ahankari (2023) supports this view, pointing out that ChatGPT lacks many of the tools required for enterprise-ready solutions. For example, the lack of

out-of-the-box integrations with popular platforms, the inability to deploy on-premises, the severely limited ability to train language models with company-specific data, and privacy and information security issues. From this perspective, ChatGPT and Gemini can be seen more as components that are integrated into the chatbot platform, extending its capabilities with access to the most advanced LLMs. For example, ChatGPT is offered by vendors as an additional option that is integrated into platforms such as OneReach.ai, Kore.ai, and Rasa. Such integration is possible due to the API provided by both ChatGPT and Gemini. While many of the components for creating virtual assistants are missing in ChatGPT, Gemini and other generative AI services, they can be used by businesses to create chatbots, but as part of a more comprehensive platform (purchased or built in-house) for creating and managing virtual assistants (Ahankari, 2023).

The use of cloud technologies helps organisations to eliminate the need for in-house server hosting. By using cloud-based AI services, they can quickly and cost-effectively build and host AI-driven solutions, increase computing power, scale digital solutions, and accelerate time to market for innovative products and services (McKinsey, 2022). Given the benefits of cloud technologies, developers of chatbot creation platforms, including those shown in Figure 3, offer cloud-based solutions to customers. In addition to highly specialised platforms that provide the full set of features needed to create and operate a virtual assistant, there are many players that offer cloud-based AI services that can speed up the creation of a chatbot. Such services can be used by developers as individual components in a complex, multi-component chatbot solution. For example, Azure AI Bot Service enables multidisciplinary teams to collaboratively build, deploy, test, and connect chatbots in a unified SaaS environment, enabling easy interaction across multiple communication channels (Azure AI Bot Service, n.d.; Patil et al., 2017). Google Cloud provides a comprehensive platform for building intelligent chatbots around Dialogflow, which includes tools for natural language understanding, context management, and integration with multiple messaging channels. Additional services such as Cloud Functions, Stackdriver, BigQuery, Cloud Vision API, Speech-to-Text, Text-

to-Speech APIs and Vertex AI extend the capabilities of chatbots with custom logic, monitoring, data analysis and machine learning tools (Cloud Computing Services, n.d.). Similarly to Google Cloud, Amazon Lex offers tools to accelerate chatbot creation by using cloud services. It integrates seamlessly with other AWS services such as Lambda, enabling developers to build complete virtual assistants within the AWS ecosystem (Amazon Web Services Inc., n.d.).

While cloud-based AI services offer new opportunities for innovation and efficiency, they also present a number of security challenges, which present a serious limitation to the use of cloud technologies in many organisations. Zahoor et al. (2023) state that these challenges include rapid adoption of new technologies without robust security, lack of regulation, unpredictability of models, potential vulnerabilities, difficulties in auditing due to lack of standards, and others. This is further discussed in section 2.2.7.

The review of various vendors and technologies in this section is not intended to identify the most appropriate platforms for implementing chatbots. On the contrary, the examples given and the variety of players and options in the market show that there is no ideal platform. Analysing the features of the platforms presented in the comparative lists of various authors, it can be concluded that many of the leading players offer a wide range of functionalities, ready-made industry solutions, as well as ready-made integrations with third-party IS. There is also a noticeable trend towards narrow specialisation of players in a particular niche, for example, the development of a platform and training of language models exclusively for the tasks of customer service, helpdesk, etc. Such narrow specialisation in certain niches means that in other industries, locations and for specific requirements, other local providers not represented in the popular platform ratings may be more appropriate. Thus, companies must carefully select a vendor that most closely matches the company's business, its capabilities, IS to integrate with, local regulation, and a specific business goal.

2.2.4 Chatbot features and characteristics

Despite the wide variety of platforms for creating chatbots, most solutions have a similar set of components. This section lists the most common terms and technologies found in most vendors' solutions.

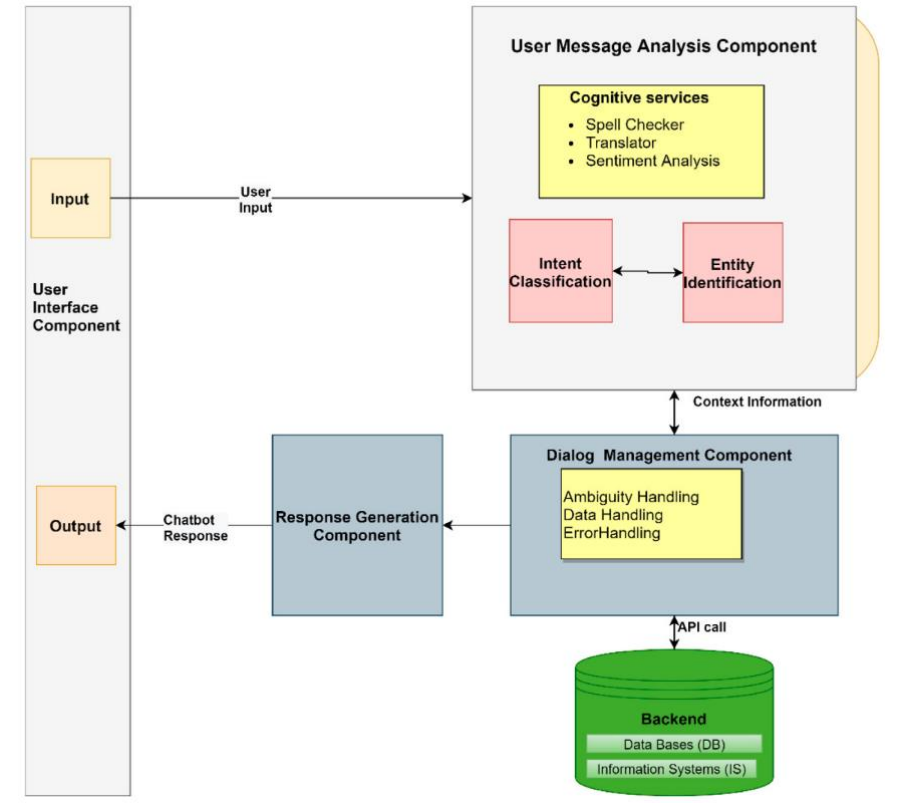


Figure 4. Chatbot modules and architecture (Adamopoulou et al.,2020)

A general chatbot architecture provided by Adamopoulou et al. (2020) depicted in the Figure 4. User interaction with the chatbot is carried out through one or more channels which represent the user interface. Virtual assistants can act on behalf of the company on social networks, such as Facebook or Instagram, in many popular instant messengers (WhatsApp, Facebook Messenger, Skype, Telegram, Viber), as a chat widget on the company's website, and through other less popular formats. Each user input or message is being processed in the user message analysis component. It leverages modern AI algorithms to process data and solve vast numbers of applicable Natural Language

Processing (NLP) tasks. NLP is an area of AI which explores computer and human interactions and develops solutions which enable machines to understand and process information in a human's language (SAS, 2022).

According to Jurafsky et al. (2010), three typical tasks are usually being solved at this stage of processing a user request. The domain classification is needed to determine the topic of the conversation and set the appropriate parameters for the bot to behaviour. Next, the function of intent recognition or intent determination is responsible for determining the purpose of the user's request and the problem that he or she intends to solve with the help of the bot. Finally, the slot filling or entity recognition function extracts from the user's utterance significant numerical, alphabetic, or other types of parameters that characterize and specify the aim. For example, in a user's utterance: "I would like to book a flight from London to Paris on the next Monday", the travelling is the domain, flight booking is the user's intent, and London, Paris and next Monday are three slots or entities which could be recognised by a chatbot: London is the origin, Paris is the destination, and next Monday stands for the flight date. Some additional data processing can be performed at this step: Speech to text (STT) transformation algorithms are used by voice assistants to automatically transform user's voice input into a text message for intent recognition and further processing. Some additional utilities can also be applied at this stage to translate user's input, automatically correct spelling mistakes, or perform other changes to increase the change for the machine to understand the user's request (Adamopoulou et al., 2020). Sentiment analysis is an NPL technique which enables algorithms to extract emotional characteristics from text data and classify them (Luo et al., 2021). Virtual assistants can benefit from using this element in their conversational scripts and take different actions depending on the user's mood. For example, in practice, it is often recommended to switch the user's communication with the bot to a human assistant when his or her mood is irritated or angry.

Next, after the analysis and parsing of the user request, the information is being transferred to the Dialog management component. It is the central element of the entire system, which forms the logic of the bot, determines its capabilities, and describes scenarios of behaviour in various situations. Harms et al. (2019) identify three approaches which used by various chatbot vendors to build a dialog management system. First, handcrafted or rule-based approach requires explicitly formulated and programmed rules. Bot behaviour can be determined as set of step-by-step actions, a more complex tree structure, or a finite state machine. Regardless of the chosen standard in this approach, the bot designer determines the steps of the dialogue and sets the rules for transition from one state to another. The opposite approach to designing bot behaviour is probabilistic. Instead of defining a strict set of rules and conditions for programming bot, probabilistic models and large datasets with real dialog sessions are used to determine bot's logic. Looking for an answer to a user request, the bot turns to the accumulated knowledge and uses machine learning algorithms to find the most likely answer. Hybrid approach combines the elements of handcrafted and probabilistic approaches and attempts to employ advantages of both. Some dialog management systems like Rasa leverage frame-based or state dialog structures to develop closed-domain systems but extend them with neural network algorithms which can improve the bots' efficiency (Harms et al., 2019).

Regardless of how it is implemented, the dialog management component is rarely a closed system. Most practical scenarios require data exchange with external IS. For example, when creating a bot that can tell users the weather forecast for the coming days, developers can use almost any of the platforms mentioned earlier in this section. The virtual assistant should be able to understand the user's request and interpret it correctly, but the bot system itself cannot have information about the current weather. Therefore, an access to external data base or External Service Interface is required (Khan, 2017). In this example, it might be an API of a meteorological service like AccuWeather. Another example mentioned earlier is booking a ticket from London to

Paris. After the user request is correctly processed by the analysis component, the dialog component is required to perform a specific action provided by the scenario. To make a booking, the bot usually accesses the backend system (CRM, ERM, any other booking management system) through the API. The result of the operation is then sent to the user according to the scenario. The Response Generation Component is used to form the user's response. In the simplest case of a text assistant, a text message is sent to the user in the distribution channel. Voice assistants use Natural Language Generation (NLG) and speech synthesis algorithms to generate a response to the user in audio format.

Business Intelligence (BI) analysis and reporting, data access and security, logging and monitoring, administration and configuration are essential components of modern chatbot platforms (Khan, 2017). Depending on the purpose and scope of various vendors, these modules can be either advanced or presented in their basic form. They all represent the necessary set of tools not only for launching a new virtual assistant, but also for the successful operation of a live chatbot as a company service.

2.2.5 Motivation to use chatbots

When business teams attempt to determine and specify a new bot's characteristics and project success criteria, users' expectation need to be analysed and prioritised. Knowledge about why people interact with bots, and what they expect them to do, and the ability of bot creators to meet these expectations, are crucial. It may prevent companies from launching complex solutions that fail to meet business goals, because the created virtual agents do not solve users' problems efficiently.

As technology progresses, internet users tend to solve their everyday problems in increasingly fast and efficient ways. Immediate response becomes the norm, and demand for self-service options grows (Bakhshi et al., 2018). Brandtzaeg et al. (2017) suggest that productivity is the major factor, which motivates users to communicate with virtual agents. The participants in their survey mentioned ease of use, immediate

response, and quick access to necessary information as the main features that make chatbots attractive for users. Some people use bots instead of search engines to ask daily questions about specific problems, or find general information such as the weather forecast. Others reported that they do not like to wait for call centre operators to respond to simple questions. This is supported by various studies (Drift, 2018; Fokina, 2023), which show that when users turn to a chatbot for help, they expect a quick answer to a simple question and the bot to be available 24/7. It is also interesting to note that for many users, a chatbot is a way of accessing a human agent through a dialogue interface (Fokina, 2023; Moran, 2022).

New products and services, underpinned by emerging technologies such as AI and NLP, often attract a large number of users who like to try them out before they become mainstream. Sometimes called “early adopters”, these customers usually ignore minor defects and provide necessary feedback for new product or technology development. The novelty of chatbot technology, curiosity of new users, and social and entertainment factors are mentioned as the most popular reasons why humans choose to interact with a bot (Brandtzaeg et al., 2017). Entertainment elements and social interaction elements can increase motivation. In addition, some people feel more comfortable when discussing intimate topics with a machine rather than a human. Hence, productivity is crucial for success, and productive bots are those which solve user’s problems in a more efficient way than any other software service or communication channel.

2.2.6 Chatbot personality

Chatbots imitate human beings in communication with users via a text or voice interface. The most advanced services can generate voice responses or enable communication with virtual agents that can communicate and express emotions in virtual environments, almost like humans (Goasduff, 2019). In pursuing the goal of creating bots that can substitute employees and represent a company’s service, bot creators apply various techniques that help them to develop realistic and emotional virtual characters with unique identity.

Personality is an important element to be considered by chatbot designers. Chatbots with a well designed and implemented personality attract more people, demonstrate better performance, cause more positive emotions, and increase the number of returned users in comparison to bots in which the creators have ignored the personality factor (Katz, 2019). Katz (2019) determines persona and personality as two separate elements of a chatbot design. While the first term describes profile attributes such as a name, gender, age, picture, hobbies, and others, the latter is associated with emotional aspects of a bot and how it interacts with users. The Five Factor Model (FFM), introduced by McCrae and Costa (1991), is a popular psychology model which studies personality. It comprises five factors which enable the measurement of individual aspects of human behaviour: openness to experience, conscientiousness, extraversion, agreeableness, neuroticism. The model is employed by many researchers to address personality of both chatbots and their users. Ruane et al. (2021) explore text based virtual agents and apply FFM for designing unique characters. They argue that personality of a chatbot is an important factor that may have a positive impact on user experience and overall performance and, therefore, should be considered by designers. Studies show that agent's characteristics such as gender or communication style affect users as most of them respond more readily when the bot's personality is similar to their own (Isbister & Nass, 2000; Liew & Tan, 2016; Smestad, 2018).

Examining the impact of anthropomorphism on chatbot-customer communication, Crolic et al. (2021) point out that the use of humanoid characters must be approached with caution. Although several studies show that using anthropomorphic characters is positive for long-term company-customer relationships, the effect tends to be negative when interacting with angry or irritated customers. The reason for this is that anthropomorphic agents create high expectations, and irritated customers have a much more negative reaction when the outcome is not in line with the initial expectations. The authors of the study argue that companies can still take advantage of human-like

agents. For example, NLP algorithms can analyse user sentiment to redirect angry customers to separate channels with non-anthropomorphic bots.

2.2.7 Data privacy and security

As AI continues to penetrate many areas, there is widespread anticipation of its transformative impact. At the same time, experts from a variety of backgrounds are raising concerns about the emerging risks associated with the use of this technology. Cyber security issues are often the subject of discussion around two terms: data privacy and confidentiality. Privacy is the right of individuals to withhold information about their lives and activities from the public and to control who can access that information and how. Confidentiality is a guarantee that this sensitive information will be reliably protected from unauthorised access (Chapple, 2019). Protecting confidentiality is the responsibility of the company, those responsible for the security of employees and anyone else who has access to sensitive information. Jessani (2023) points out that although AI has been applied for a relatively long time, the recent growth of generative AI presents new challenges from a data privacy perspective. ChatGPT, as well as many similar LLMs, use huge amounts of data from the open internet and other sources to do their work. However, the developers of these models are not always able to prove the legality of the use of information, whether copyrights have been respected, and the technical design of many algorithms does not allow them to determine exactly which data sources the model is using to generate a particular text. This leads to various confrontations between the creators of language models and content authors. For instance, The New York Times sued OpenAI and Microsoft for copyright infringement over the use of millions of its articles to train chatbots that now compete with the newspaper's own material (Grynbaum, 2023).

The General Data Protection Regulation (GDPR) and California Consumer Privacy Act (CCPA) are the major data protection regulations which concern data privacy in the EU countries and California (USA) respectively. Additionally, some industry-related acts supplement them with more specific requirements and standards related to particular

industries. For example, the Health Insurance Portability and Accountability Act (HIPAA) regulates the protection of health information in the healthcare domain. The laws prioritise privacy by establishing people's rights over personal data, including the right to access, correct and delete personal information. They require organisations to be transparent about their data collection, processing, and sharing methods. They also emphasise the importance of obtaining consent from individuals before collecting or processing their data and require robust data protection and privacy measures to protect personal information from unauthorised access and breaches (California Consumer Privacy Act (CCPA), 2023; Data protection in the EU, 2023; Health Information Privacy, 2023). Many countries have their own local legislation regulating the collection, processing and storage of personal data. For instance, Personal Information Protection and Electronic Documents Act (PIPEDA) addresses data privacy in Canada (Office of the Privacy Commissioner of Canada, 2021), General Data Privacy Law (LGPD) is the GDPR analogue in Brazil (Lei Geral de Proteção de Dados Pessoais (LGPD), 2019), and Personal Data Protection Act (PDPA) is applicable in Singapore (PDPA overview, 2021).

Jessani (2023) argues that these existing regulations are quite applicable to chatbot developers, and largely capable of regulating this industry. However, the author also points to many new ways for AI to collect, process and use information that cannot be clearly assessed from the perspective of existing data protection laws. For example, information provided by the user when interacting with a chatbot can be used by the latter to adapt its behaviour and provide the user with a personalised service, as well as to display targeted advertising. It is difficult to say whether the law requires the user's consent for the information they provide to be used in this way, but many users may find such behaviour unethical. Carmichael (2023) adds that the media regularly presents new cases of incorrect and harmful behaviour of AI, which include examples of gender, racial discrimination, as well as other forms of bias. Such cases may not always be in

breach of current legislation, but they trigger negative public reaction and widespread debate.

The European Union has introduced the AI Act to address the risks associated with artificial intelligence, marking the first significant AI legislation by a major regulatory body. The Act aims to ensure that AI is used safely and with respect for human rights, balancing the needs of people and companies. In April 2021, the European Commission proposed this regulatory framework, categorising AI systems according to their risk to users, with varying degrees of regulation. By 9 December 2023, the European Parliament and the Council reached a provisional agreement on this legislation, setting the stage for it to become official EU law once formally adopted. The AI Act divides AI applications into three categories: high-risk applications that are prohibited, high-risk applications with specific requirements, and less critical applications with minimal regulation. This categorisation aims to prohibit potentially harmful uses of AI, while imposing stricter controls on high-risk scenarios. This law represents an important effort to promote a fair competitive environment and protect public interests in the context of AI advancements (EU Artificial Intelligence Act, 2024).

Sebastian (2023) summarises common methods for maintaining the privacy and security of data used when training or operating chatbots:

- Data anonymisation and aggregation protect privacy by replacing identifiable information with artificial identifiers, or by combining data to eliminate personal identifiers.
- Differential Privacy provides a mathematical approach to privacy that allows the sharing of patterns in data sets without compromising individual data, which is critical to preventing AI models such as GPT from storing sensitive information.
- Secure Multi-Party Computation enables collaborative computation over private inputs, facilitating collective data analysis without exposing the actual data, important in scenarios with multiple data owners.

- Privacy-aware machine learning algorithms, including federated learning, are designed to prioritise privacy by training algorithms across multiple devices without sharing local data samples.
- Techniques such as adversarial training improve the robustness of AI models by training with inputs designed to challenge the model, while robustness testing ensures that models can handle unexpected inputs.
- Data Verification and Secure Data Sourcing are essential for maintaining the quality and authenticity of training data, emphasising the use of data from trusted sources that meet legal and ethical standards.
- Measures such as rate-limiting and blocking automated queries help protect systems from misuse and automated attacks.
- Anonymisation and encryption techniques play a central role in AI data protection, making it difficult to link data back to individuals and protecting it from unauthorised access.

Sebastian (2023) claims that many data protection methods could limit chatbot capabilities, increase development costs, and affect the user experience. Yang et al. (2023) also note that companies developing chatbots face a significant challenge in balancing the need for data security with maintaining the effectiveness of their services. The authors analyse the security threats related to chatbots and highlight the challenges that chatbot developers face when trying to meet high privacy and security standards. The lack of comprehensive rules on how to keep chatbots safe is associated with high risks and the need to invest in new technical solutions. This is particularly difficult for smaller companies with limited budgets. Development teams also vary in their understanding of security, so companies need to invest in proper training for their employees to avoid security issues. Gaining the trust of chatbot users is another big privacy issue, because if users do not fully understand how their data is being used, they are more likely to avoid using chatbots. Concerning the practical application of the GDPR for development companies, Wolford (2023) states that data protection principles

should be a priority. Accordingly, data protection requirements should form the basis of the design and analysis of every new digital product and service.

IT governance frameworks such as COBIT can improve IT security and facilitate AI adoption by providing organisations with the necessary tools and methodologies to ensure risk management, compliance and strategic alignment with business objectives. Developed by ISACA (Information Systems Audit and Control Association), the COBIT framework, originally designed for information and technology governance, can be effectively applied to the integration of AI technology (ISACA, 2024). The latest COBIT 2019 represents a more flexible approach that can better respond to the challenges associated with AI technology adoption. Organisations can benefit from using COBIT because it aligns IT initiatives with business objectives, maximising benefits and minimising risks in AI implementation projects. Its risk management processes help ensure that AI systems comply with regulations, protect data privacy, maintain cybersecurity, and mitigate bias. COBIT also guides organisations in establishing clear privacy policies, security measures, and regular audits of AI algorithms to ensure compliance. In the context of the development of AI and the emergence of new specific challenges, specialised IT governance frameworks and standards such as ISO/IEC JTC 1/SC 42 (iTeh, Inc, 2017), NIST AI Risk Management Framework (NIST, 2024), The Assessment List for Trustworthy Artificial Intelligence (ALTAI) (European Commission, 2020), and others have been developed by various organisations and national regulators.

2.2.8 Section summary

After analysing the literature on the evolution of chatbots and the various elements that form an integral part of a modern chatbot, it can be concluded that the evolution of chatbots has progressed from simple scripted programs like ELIZA, which relied on predefined responses, to advanced AI-powered systems that understand context and can process natural language. Modern chatbots use LLM and are integrated with multiple data sources, enabling them to provide personalised services. Despite these

advances and the growing acceptance of chatbots, there is still a gap between research progress and practical application, and many users still prefer to interact with a human assistant. A review of chatbot development platforms shows that it is diverse and not consolidated. Many players are achieving leadership by focusing on producing products for specific niches and industries. Cloud solutions are offered as a way to quickly deploy chatbots with the possibility of further flexible scaling. However, on-premises solutions are also in demand, especially where companies prefer to store and process customer data on their own servers. As AI and cloud solutions are increasingly integrated into different industry sectors, data privacy and confidentiality are becoming increasingly important. Various regulations such as GDPR, CCPA, the European Union's AI Act and governance frameworks address these issues, and organisations need to prioritise data security practices and compliance with local regulations.

2.3 Implementation challenges

Despite the undoubted benefits of chatbots, there are relatively few success stories. The experience of companies shows that when working with their chatbots, users have to make more effort to achieve a result compared to solving the problem on their own or communicating with a human being. According to CB Insights (2021), high user expectations are not always justified as the technologies and methods for creating chatbots are far from perfect. Many companies tend not rush to adopt new technology and prefer to observe and learn from others. In most cases, successfully launched chatbots automate only a particular business process or activity. Also, bots mostly supplement pre-existing reliable processes, hitherto supported by other information systems. Leading technology corporations, such as IBM, Google, Amazon, and Microsoft, provide cloud services that allow technical teams to deploy AI-powered conversational bots relatively quickly. However, available online services and open-source software cannot solve company-specific problems that require implementation of custom bot behaviour, data preparation and integration (Gwendal et al., 2020).

Srinivasan et al. (2018) surveyed more than 300 business executives and IT directors in 12 countries around the world to find out their attitudes towards the prospects of implementing chatbots in their organisations, as well as to examine existing experiences. Difficulty and scepticism in accepting a new way of communicating from users, the limited capabilities of chatbots and their inability to provide a personalised service, and the high number of errors in handling user requests are the most common challenges companies face when implementing chatbots. Besides the complexity of the technical component of chatbots, there are organisational difficulties that companies must overcome when implementing this new technology. The authors of the survey also point to the difficulty of addressing data security issues and compliance with local data protection laws, the lack of skilled labour, high integration costs, and the difficulty of platform selection due to high vendor fragmentation. This is confirmed by Kaushal et al. (2022), who argue that companies have difficulties with platform selection and integration when implementing chatbots. The majority of chatbot platforms do not provide the necessary functionality for testing and customisation of chatbots. At the same time, the resulting behaviour of the virtual assistant may fail to meet user expectations regarding quality, responsiveness and ability to correctly process a request formulated in human language.

Despite justified criticism from businesses regarding the conversational capabilities of modern chatbots, the results of research groups and demonstrations of the capabilities of chatbots from major technology companies show that the quality of a virtual assistant's dialogue is almost indistinguishable from that of a human. In practice, however, companies are severely limited in what they can do because many NLP tasks are hard (Dilmegani, 2022). The creation of a perfect interactive assistant requires large computing resources, the financial resources for collecting and processing large amounts of data to train the language models, as well as the availability of the appropriate specialists in the team (Varitimiadis et al., 2021).

Challenges for chatbot developers are not always directly related to technology, organisational issues, or costs. It is worth noting that even a perfectly implemented chatbot that takes advantage of all the technologies currently available may not be popular with users. Many users tend to be conservative and do not rush to reject a human-assisted service. Their scepticism is also a result of negative experiences with virtual assistants who were unable to do the job appropriately (Drift, 2018).

All of the above coincides to some extent with the findings of Fach et al. (2019), who asked more than 90 leaders from different organisations worldwide to share their views. The most frequently mentioned challenges can be arranged in following categories:

- **Setup challenges.** Activities related to the obtaining, preparation and processing of big data, bot training, implementation and launch, support and maintenance.
- **Customer acceptance.** Not all users are ready to interact with virtual agents. This situation is expected to gradually improve, so in the long term, such difficulties should not prevent the introduction of new technology.
- **Language challenges.** The communicating with users in a language they understand is not easy for a number of reasons, which include technical limitations, difficulties in understanding various accents, as well as the ability and competence of companies to deal with natural language processing (NLP) tasks.
- **Regulatory restrictions and data security.** The internal rules of companies, as well as legislation in the regions in which companies operate (for example, GDPR), have a significant impact on the system architecture of chatbot systems, methods of receiving and storing customer data. All this greatly complicates the process of developing virtual assistants in practice and increases the cost of implementation.
- **Technology-related challenges** are not the main challenges, but still need to get addressed. It is advisable to implement technologies from strong vendors that

have mature solutions, innovative features, and flexible APIs for integration with other IS.

The findings of Srinivasan et al. (2018) and Fach et al. (2019), are based on a study of the experiences of hundreds of companies that have implemented a chatbot in their business. The most popular and common challenges across most industries are identified, grouped and categorised. At the same time, these studies and other publications reviewed in this section pay little attention to explaining the reasons for the identified challenges, nor do they offer comprehensive approaches to overcome them. Therefore, these materials provide a strong foundation for further research in this area to formulate strategic approaches that lead to more successful implementation of chatbot projects.

2.4 Critical success factors and success measurement

The project management triangle, sometimes called the “iron triangle”, has been used for over 50 years to estimate project success. Time, quality and budget are the three parameters, which determine project objectives and allow the definition of measurable goals (Atkinson, 1999). Project success is related to the ability of a project team to deliver their work on time, and to budget, by adhering to the project scope. Researchers and practitioners often criticize this approach, and argue that being on time, on budget, and releasing a product according to the initial specification, does not necessarily guarantee overall success (Dvir et al., 2003).

Pinto et al. (2004) analyse project success in the context of organizational management, and identify three ways of measuring success. First, project management success can be assessed on measurable results, using a cost performance index (CPI), earned value analysis (EVA) or other numerical parameters. Second, project success concerns changes that have measurable impact at an organisational level, and indicates how these changes improve a business process, product or service quality. Third, success within a project portfolio relates to overall project performance compared with other similar

projects within the organization (Pinto et al., 2004). A distinction should be made between operational and strategic types of projects. While the managers of the first type are focused on meeting project goals, which are usually measured by three parameters of the “iron triangle”, strategic project success is more likely to be seen in terms of improved customer experience or gain in competitive advantage. Chatbots, like other high-tech or AI projects, can be characterised as risky, expensive and complicated, because they employ new tools that have not been widely used before. However, companies that accept the high risk and price, and invest in such projects, can benefit from a dramatic improvement in the business indicators that have strategic value for the company (Shenhar et al., 2001). Obviously, there is no one ideal criteria or model to measure project success. Nevertheless, chatbot project managers should be prepared to deal with high risk, uncertainty, and complexity, and focus on achieving business benefits, improving customer service and delivering outstanding performance.

Next in this section, the critical success factors approach is presented, which is a common tool for strategic planning of successful projects. It also introduces various metrics that, in addition to project management success criteria, are used by companies to measure the success of a project in terms of its impact on the business.

2.4.1 Critical success factors approach

The term “critical success factors” (CSFs) is coined by Daniel (1961) who analyses the problem of the lack of connection between a large amount of information relevant to the company, generated by the information systems, and the strategic plans and actions of the company's employees. He defines CSFs as areas where the achievement of high performance contributes to the success of the organisation. Rockart (1979) develops the idea of using CSFs and formulates a new method for planning information systems in organisations. Bullen et al. (1981) publishes a more comprehensive work on the subject, which is a more practical guide to the CSF method, aimed at managers of organisations involved in strategic planning. The authors give examples of the use of the method in different industries, describe many sources of critical factors and present a hierarchy of

CSFs linking industry, organisation, and individual levels. They present the method as universal, suitable for any type of organisation, and applicable to both strategic planning and planning of the individual needs. Bullen et al. (1981) characterise critical success factors as project related areas in which sufficient results will guarantee successful achievement of the project goals. The identification of appropriate CSFs, to be used throughout the whole project life cycle, can help managers to prioritise their work, and dramatically increases the likelihood of project success. Shank et al. (1984) argue that the CSF methodology can support top management teams in a top-down strategy development process, as a way to communicate the need for, and direction of, change. They also highlight the subjective nature of CSFs, because of their strong relation to the corporate context, experiences of individuals, technology used, and other factors.

Rockart's (1979) original approach to CSFs identification through interviews is based on three sessions. The first session is to formulate and discuss the strategy with the company's managers and identify factors that are directly related to the strategic objectives of the organization. In the second session, the results of the previous stages are discussed, and the most important factors are identified in accordance with the chosen strategy. Finally, the third session may be needed to refine the selected CSFs and how they will be measured. Although the original CSF method was formulated mainly for IS strategy planning, it has been adopted and altered by many researchers to be applied in various cases. The spread and development of the method is associated not only with areas of application, but also with the development of the method and the emergence of new ways to identify CSFs (Cooper, 2008). According to Sabherwal et al. (1994), CSFs can be obtained from a literature then clarified with respondents using questionnaires technique. Depending on the objectives, the CSFs method can be modified by involving in the planning process not only top management but also employees at different levels of the organisation (Bullen et al., 1981). The scope of the method is not limited to the strategic planning of the organization as a whole, as

defined by its authors. Many academics argue that CSFs can be used locally to deliver projects or transform business practices (Cooper, 2008). For instance, Dora et al. (2021) employ CSFs method to examine the adoption of AI in the food supply chain, Chow and Cao (2008) apply it to agile software projects, Ngai et al. (2008) use it in the adoption of enterprise resource planning.

Critical success factors can vary depending on the objectives. Rockart (1979) divides them into two types: monitoring and building. Factors of the first type help to control the successful functioning of the most important existing business processes of the company. Building CSFs, on the other hand, are a tool for creating something new or implementing transformational changes. In most of the examples of identified CSFs provided by Rockart (1979) for various organisations, the list of factors contains five to eight items. Although the use of longer lists has been criticised, many researchers present a much larger number of factors and organise CSFs into hierarchical structures and propose different ways to categorise or prioritise them (Cooper, 2008). For instance, Griffin (1995) proposes a CSFs categorisation scheme for lodging yield management systems which includes five categories relevant to this area; Huang et al. (2014) explore the critical success factors that influence knowledge management implementation using a model of seven constructs to organise the factors according to their source.

For the purposes of this research, chatbot implementation success factors are analysed in this section from different perspectives through a broad analysis of research publications, experience of leading IT integrators, and relevant case studies.

2.4.2 Critical success factors for implementing chatbots

One of the first steps organisations should take when embarking on a chatbot implementation is to identify the business need, assess the business value, and select the appropriate metrics (Henke et al., 2016; Franke, 2018). When determining business value, it is equally important to understand the benefits to the user and plan

functionality that provides value for both to the customer and business (Robinson et al., 2017).

The next step is to determine whether the dialogue interface is suitable for solving the business problem. Frequently repeated simple customer requests, tasks that waste a lot of staff time, problems that are difficult for users to solve on their own using alternatives, scenarios that involve two-way dialogue in the process - these are all areas where a chatbot can be effective (Sengupta et al., 2017). A feasibility assessment should also be carried out, including business process readiness, availability of and access to the data required to run the bot, technical readiness of the IS for integration and availability of the required API, and other aspects of business readiness for AI/ML projects in general (Bakhshi et al., 2018; Chakrabarti et al., 2019; Franke, 2018; Sengupta et al., 2017).

Robinson et al. (2017) argue that the first version of the chatbot should solve a simple task, but one that is important from the customer's point of view. However, companies should avoid developing too simple bots which usually irritate customers and cause negative emotions (Bakhshi et al., 2018; Brandtzaeg & Folstad, 2017). The subsequent development of the service should be iterative, and the choice of new scenarios for automation should be based on the study of user behaviour and needs (Franke, 2018; Robinson et al., 2017), and the possibilities offered by new achievements in the field of AI. A focus on rapid deployment of simple but useful functionality, widespread use of the MVP (Minimum Viable Product) method and an iterative approach to evolving chatbot functionality characterise the approach of leading IT integrators such as Deloitte (Bakhshi et al., 2018; Robinson et al., 2017), Accenture (Guzman et al., 2016), IBM (Guenole et al., 2018), KPMG (Franke, 2018) and other chatbot implementation service providers.

When it comes to implementing a new service, every organisation is faced with the question of whether to develop it in-house or engage an experienced IT integrator. Dasgupta et al. (2019) argue that the use of the buy approach is most justified when a

new chatbot needs to be launched relatively quickly with limited resources. In this case, the integrator's expertise and the rich out-of-the-box functionality of existing platforms can help to launch the MVP and ensure the subsequent evolution of the service. The advantages of a more complex build approach include greater independence from third party companies and platforms, as well as the potential to create a more advanced product that goes beyond the standard capabilities of popular platforms (read more about build and buy approaches in sub-section 2.5.1). When choosing a third-party solution, the choice of platform and vendor requires careful consideration. Making the right choice will largely determine the quality of the chatbot service, while choosing a system that does not meet technical and security requirements, compliance requirements can lead to significant problems (Pérez-Soler et al., 2021; Srinivasan et al., 2018). Reporting and monitoring capabilities are also important. The selected platform must provide detailed reports about the chatbot performance according to the selected metrics (Bakhshi et al., 2018). During the platform selection process, companies should also explore vendor options in their industry field and locality. These include user platforms and devices, applied NLP libraries and SaaS platform providers offering localised solutions. Knowing the most popular instant messaging platforms helps to provide users with the option to chat on their favourite messenger. Supporting multiple messengers and focusing on the most popular platforms in the country of operation is important to meet the needs of most users (Sengupta & Lakshman, 2017).

In most cases, companies create chatbots as a complementary service to an existing service provided by a contact centre or digital product, such as a website or mobile application. Given the existing alternatives, in order to be successful, the virtual assistant must be more convenient and therefore solve users' problems in a more efficient way than any other communication channel (Brandtzaeg & Folstad, 2017; Robinson et al., 2017). Accuracy in recognising user requests, quality of responses, ability to qualitatively mimic human behaviour in dialogue are key usability factors that determine user trust (Folstad et al., 2018). Likewise, Nordheim et al. (2019) and Yen and

Chiang (2021) state that usability, the quality of the information provided by the bot, the ability to solve user problems, and the ability to exhibit social behaviour are factors that greatly influence whether users want to turn to virtual assistants to help solve their problems.

An important aspect of modern digital service is personalisation. Users are used to receiving content that is targeted to them, so when creating a chatbot, it is important to use data from CRM or other IS, which allows you to empower the virtual assistant with knowledge about the customer (Bughin et al., 2017; Fokina, 2023; Luo et al., 2021).

According to ContactBabel (2021), the level of automation in webchats is increasing every year, but is still relatively low. Although modern NLP algorithms show impressive results, chatbots often make mistakes in determining the intentions of users. Even when a question is correctly recognised, the chatbot may not be able to formulate an answer because the task is too complex or requires mandatory human participation. In most cases, companies use chatbots to handle initial enquiries and answer simple questions. At the same time, more than half of all enquiries end with a transfer to a human assistant. Hence, so-called blended communication (switching the dialogue to a human when a bot can't handle a user's request) is a common method used by companies to enable service excellence. (Fokina, 2023; Sengupta et al., 2017).

AI algorithms used in chatbots for natural language processing need to be tuned (trained) on a regular basis. The initial training is usually carried out at the stage of creating a chatbot, using the company's previously collected data. This is necessary in order to train the chatbot to better understand industry-specific text or information related directly to the company's activities. Companies should invest time and resources in regular bot training, when the service is running. The analysis of incorrect answers and subsequent adjustment should be done on a regular basis so that the quality of service is constantly improved and the behaviour of the bot is adapted to any changes in the company's processes (Bakhshi et al., 2018; Overend et al., 2019; Robinson et al., 2017). Once the chatbot is up and running, it is important to evaluate its performance,

monitor the key metrics that were identified along with the project goals during planning. This can be done by using the dashboard built into the chatbot platform, or by creating a new one if necessary (Bakhshi et al., 2018; Robinson et al., 2017).

Franke (2018) states that promoting the benefits of a bot is essential for faster adoption of a new service. By constantly offering its new features, a virtual assistant can explain its benefits to users, encouraging them to try out a new tool.

By examining the experience of implementing chatbots in different industries, researchers point to both general factors inherent in the process of implementing chatbots in general, as well as factors specific to a particular industry. Zhang et al. (2021), who examine organisational factors that influence the successful implementation of chatbots in the customer service segment, point to a number of CSFs specific to customer service. Management's ability to recruit new team members AI trainers who focus on developing chatbot skills and updating content is essential. In customer service, this should be a new role that combines the responsibilities of a customer service supervisor with some basic AI skills. In the banking sector, the success of chatbot adaptation in mobile applications largely depends on the convenience and usefulness of the virtual assistant. That is, on its ability to provide a more convenient way to complete a user's task than a mobile application interface (Alt et al., 2021). In some sectors, such as healthcare and banking, security and privacy issues are a high priority and affect the functionality of the chatbot. In order to receive the service, users of such organisations usually need to be authorised according to the organisation's strict procedures and existing legislation (Bhuiyan et al., 2020).

2.4.3 Chatbot metrics and KPIs

In their discussion about the methods used to evaluate chat bots, the Casas et al. (2020) highlight the lack of common standards and the tendency of different authors and organizations to create their own approaches. The analysis of publications by Radziwill et al. (2017) identify the main criteria for assessing the quality of chatbots, which are

classified into three groups: Efficiency (goal-oriented, resistant to manipulation and handling unplanned scenarios), Effectiveness (accuracy of NLP functions, humanity and general ease of use), and Satisfaction (showing emotions and mood, ethical behaviour, knowledge of the users, awareness of trends and context). Similarly, by analysing how chatbots are evaluated and what are the metrics associated with their successful implementation, Peras (2018) formulates five perspectives for chatbot assessment:

User experience perspective. Evaluation of the quality of the chatbot in terms of user experience, ease of use, ability of the chatbot to complete the user's task with minimal effort from the latter. The evaluation is mainly qualitative and based on the study of users' opinions.

Information retrieval perspective. This category reflects ways to evaluate a chatbot's ability to find, receive and provide necessary information requested by a user.

Linguistic perspective. Approaches and metrics in this category evaluate the quality of a bot's NLP module, its linguistic skills, and the ability to generate a relevant response.

Technology perspective. This category recognises the excellence of chatbot technology in terms of its ability to simulate human behaviour, and its ability to understand natural human language.

Business perspective. The business approach is pragmatic, therefore many companies approach chatbot measurement in terms of value generated. When implementing a chatbot to reduce human labour, companies compare the results of a chatbot to a human and measure the amount of work performed. They use quantitative measures such as the number of conversations, the number of successful and unsuccessful conversations, the duration of the conversation, and others. This approach is supported by many business publications, which offer companies implementing chatbots a similar set of quantitative metrics to evaluate a chatbot's effectiveness. Here are some of the most commonly used (Chung, 2023; Rajnerowicz, 2023; Visiativ, 2023; Zendesk, 2022):

Total number of users – how many unique users communicated with the chatbot daily, weekly, monthly.

Goal Completion Rate (GCR) – this metric tracks how often the bot successfully completes the task or specific action that is considered to be the goal. For example, accepting an order from a customer, responding correctly to a request for information, etc.

User Satisfaction – the metric is a quantitative reflection of how users value the bot's work. In practice, it can be measured by polling users at the end of a completed conversation.

Human handover rate – shows how many dialogs required human takeover due to the chatbot failure to process a user's request correctly.

Bounce rate – reflects the percentage of interactions with the chatbot that failed to correctly process the user's initial request, causing the user to 'bounce', i.e. stop interacting with the bot immediately.

Retention rate – percentage of users who returned to the chatbot for help after a while. This indicator reflects the quality of the service and its acceptance by users.

Average response time – reflects the speed of a chatbot and shows the average time it takes to find the necessary information and formulate a response to a user.

Conversation length – measures the average length of a user's conversation with chatbots.

This list of metrics is not exhaustive but shows popular indicators which can be used to measure user engagement, conversions, and satisfaction. Rajnerowicz (2023) recommends using Google Analytics, popular website analytics tool, for setting up dashboards with required chatbot KPIs or use chatbot platform's reporting tools if they are available. In general, the business approach to evaluating the effectiveness of a chatbot is similar in many ways to the approaches and methods companies use to measure the effectiveness of websites and mobile applications. From their perspective,

chatbot analytics is necessary to measure the effectiveness of a chatbot and identify opportunities for improvement (Chung, 2023).

2.4.4 Section summary

The literature review in this section highlights the critical success factors approach as a widely used tool for strategic planning of successful projects. It has been used effectively for decades to address strategy development problems, including AI adoption projects. The review also presents various metrics that companies use, in addition to project management success criteria, to measure the success of a project in terms of its impact on the business.

2.5 Relevant models and frameworks

2.5.1 The TOE framework

Different technology adoption and IS strategy development models are of relevance to chatbot projects. For instance, the Technology Organization Environment (TOE) framework, developed by DePietro et al. (1990), is widely used by researchers to study the new technology adoption process. It is based on three factors which influence the technological innovation decision making process in a company (Figure 5).

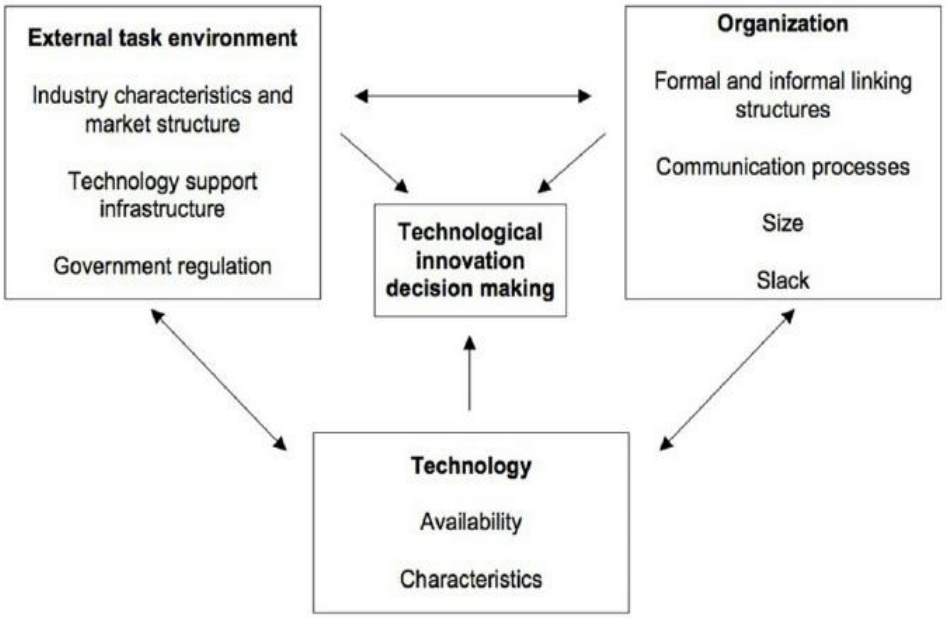


Figure 5. The TOE framework (DePietro et al., 1990)

The technology factor is a set of external or internal technologies that are available to the company. They include IT infrastructure, hardware, network communication, software packages and services, and processes that enable the technology usage. The effective use of technologies and their characteristics define a strong basis for the successful transformation process. For adequate use of technologies, organizations should evaluate their capabilities in terms of organization culture and structure, its size, established processes, availability of managerial and engineering talent, and availability of other resources (DePietro et al., 1990). IS researchers point out the strong connection between the technology and organization context. Successful transformation is usually a result of the appropriate analysis and management of these organisational factors. The environmental factor comprises the market segment where the business operates, competitors' activity, availability of service providers, government regulations and macroeconomic conditions (DePietro et al., 1990).

The TOE framework is relatively old for the fast growing and rapidly changing IT industry. However, it is still frequently used in its original form by scholars in research

projects, which aim to study digital transformation in various industries: electronic data interchange (EDI) (Kuan et al., 2001), enterprise resource planning (ERP) (Awa at al., 2016), electronic customer relationship management (eCRM) (Racherla et al., 2008), e-commerce (Oliveira et al., 2011), e-business (Il'in et al., 2017), and many others.

In some cases, scholars modify the TOE framework or use it in a combination with other theoretic models to focus their study on the aspects that are specific in their research area. Wynn et al. (2021) develop a new maturity stage model for analysing e-Government readiness by studying cases in a local administration in Libya. The authors employ the original technology and organization domains from the TOE but determine the process efficiency as the third element in their model which has a significant impact on the e-Government adoption according to their theory. Additionally, the new Technology Organization Process efficiency (TOP) model extended with organization maturity levels. Such combination adds comparative characteristics and dynamic view to the TOE, which is general, descriptive, and static by its nature.

The TOE has often been characterized as a descriptive model that is effective on an enterprise level. The critics mention that it is less suitable for studying new technology adoption and process changes at local departments across the company (Awa et al., 2016). The theoretical frameworks designed to study large companies are unlikely applicable to SMEs where the structure, processes, resources, and other characteristics are different (Thong, 1999). For instance, the role of CEOs is central in SMEs and, therefore, their knowledge, background, and vision potentially influence the innovation process alike other three factors of the TOE (Ter Chian Tan, 2010).

As demonstrated by a series of research publications, the TOE framework can be successfully applied to AI and chatbot technology adoption studies. Ikumoro (2019) proposes a new conceptual framework that employs the TOE framework and the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al., 2003) to assess the integration potential of "conversational agents" (i.e., chatbots) in the e-Commerce sector, among small-to-medium sized enterprises (SMEs) in Malaysia. Pillai

et al. (2020) examine the adoption of AI technology and chatbots for talent acquisition in companies. The study proposes a new model based on the TOE framework and the Task Technology Fit (TTF) model (Goodhue et al., 1995), and identifies elements that positively impact the new technology adoption. Chen (2019) explores critical success factors that affect customer service chatbots adoption in telecom firms in China. Kruse et al. (2019) analyse the key drivers of successful chatbot adoption by interviewing experts from the financial services industry, and use the TOE framework to achieve a comprehensive and structured view of the research data. The variety of these application cases indicates that the TOE framework can provide a universally consistent view of new technology adoption. It breaks enterprise complexity into three domains and establishes a link between human and technical worlds.

2.5.2 Earl's model

Earl (1989) studies the evolution of IT and describes how companies migrate from the data processing (DP) to information technology (IT) era.

He argues that executives understand the strategic potential of IT and reorient their information systems from business process support to systems that enable the competitive advantage. During the DP era IS development was driven by ad hoc requests and well managed IT department was able to react to the requests and produce changes using available technologies. Later IT becomes an integral part of every business strategy and managers require a strategic planning approach for IT that should not be complex. It is essential to understand not only the best modern IT practices but also predict the likely changes and be able to adapt to a rapidly changing competitive environment.

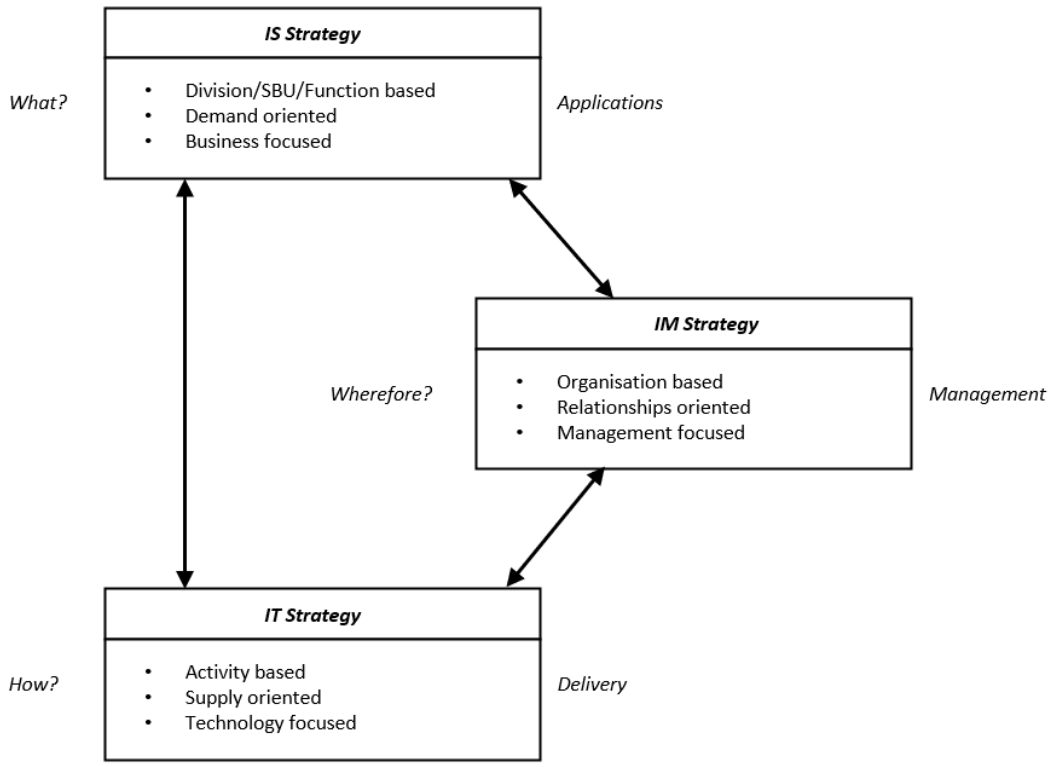


Figure 6. Three levels of IT strategy (Earl, 1989)

The author identifies three levels of strategy in IT (Figure 6). **Information system (IS)** strategy is demand-oriented and answers the question "what to do with the technology". It defines the organisation's needs in terms of software systems and their functions with a strong focus on business objectives. **Information technology (IT)** strategy is activity-based and technology-focused. It answers the question "how", manages system requirements, standards, architecture, security, vendors and delivers new technology to the company. **Information Management (IM)** strategy is concerned with the role of IT and its synchronisation with the other business activities across the company. It deals with the issues of "how", "who" and "which way" and establishes a management control for IT (Earl, 1989).

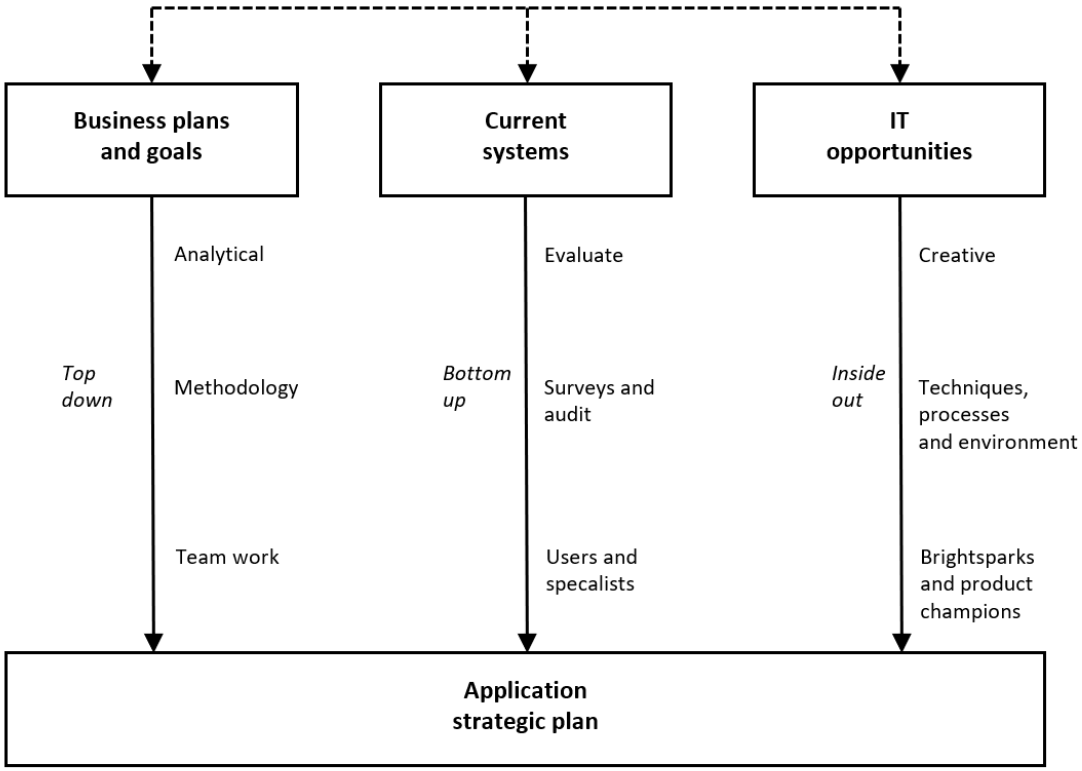


Figure 7. Earl's approach to IT strategy development (Earl, 1989)

Further, Earl (1989) determines the multiple methodology for IS strategy formulation (Figure 7). Its first element is the **top-down** method. This is an analytical deductive approach that identifies business plans and IS needs. The critical success factors (CSFs) analysis is commonly used by teams in forms of interviews, workshops, or document analysis to establish a connection between the business goals and IS requirements. The **Bottom-up** approach assumes that some existing IS have strategic potential and their functionality can support other business activities that provide a competitive advantage. Thus, an audit of current systems is required to recognize which ones need to be updated, what kind of add-ons or extension modules exist, what is the potential for enhancement and further development. The third element of Earl's strategy is the **inside-out** that identifies innovation opportunities and discovers the new strategic potential for the company. Investments in RND, human talent and development of

technological culture across the organisation will foster innovation and speed up new technology adoption (Earl, 1989).

Wynn (2009) applies Earl's model to an analysis of eight case studies which aim to assess IS strategy development and implementation in SMEs. The author tests all three elements of Earl's model (top-down, bottom-up, inside-out) and concludes that each of them can be effectively used in SMEs and have practical implication for IS strategy development.

According to Earl (1989), there is no one perfect IT strategy that works for every company. On the contrary, important aspects for formulating the IT strategy are heavily dependent on the market segment, competitive environment, internal resources, company culture and many other factors that influence every business (Earl, 1989). In his study, the author describes more than 20 frameworks that provide an applicable approach for IT strategy planning and suggest practical models that break this complex process into manageable actions. It is all about how to win the competition using IT and how to develop appropriate IT strategy at corporate level. However, Earl's model, especially the principles formulated for inside-out innovation, can be considered for managing AI technology adoption at a business unit or department level.

2.5.3 Heeks's model

IS integration projects in developing countries have a relatively high rate of failure comparing to the developed countries. Heeks (2002) develops a model that explains the reasons of failures, identifies risks, and provides recommendations on how projects can better achieve their initial goals. By analysing the environmental factor, the author concludes that the successful IS implementation is usually a result of selection of system that most fully match organisation context, stakeholder expectations, and technical requirements. The paradox is that complete match of the IS to the environment does not transform that environment and can unlikely produce desired outcome for the organisation. The greater degree of change represents the higher

potential for improvement and higher risk. Thus, the success is influenced by the amount of the organisational change caused by IS implementation (Heeks, 2002).

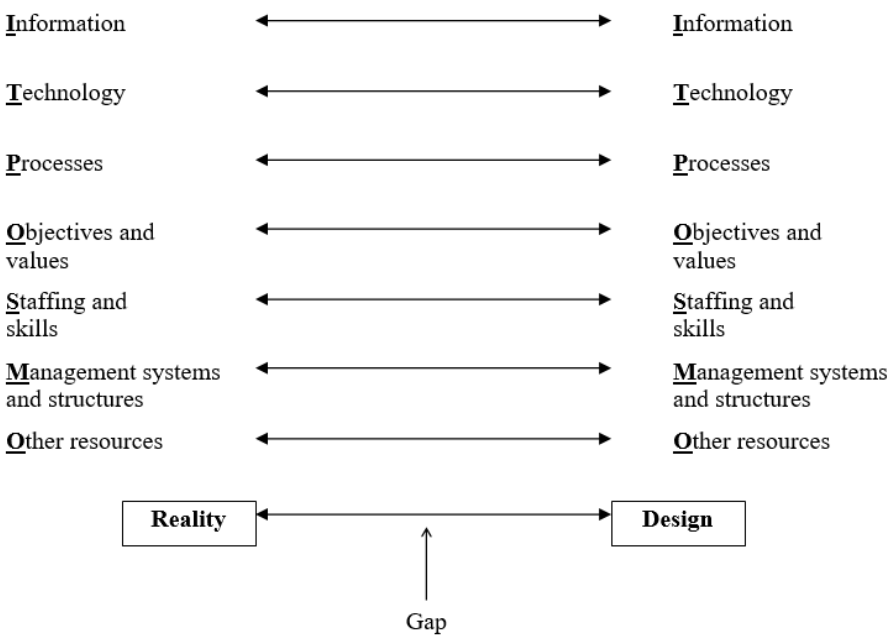


Figure 8. Heeks's Design-Reality gap model (Heeks, 2002)

Companies rely on IS system design, best practices, case studies and literature that were produced in developed countries and cannot be applied to projects in developing countries without modification because the environment is different. This mismatch causes gaps between the new proposed IS design and reality. The author arranges these gaps in 7 groups (Figure 8): Information, Technology, Processes, Objectives and values, Staffing and skills, Management system and structures, Other resources. Further, the researcher employs his 7-gap model to analyse different risk categories, identify gaps, group them according to the model and propose activities that reduce these gaps and increase chance of success.

Heeks' model is frequently employed by business researchers from many countries to analyse and assess new IS implementation in different areas. Lessa et al. (2012) use the design-reality gap model to investigate failures in e-Government implementation project in Ethiopia and formulate their findings as a set of recommendations that can be

applied to other similar projects. Masiero (2016) applies the model to a e-Government system implementation in south India and identifies the relation between the failures and causes. Other examples illustrate that the model is especially effective in large projects with local cultural context that generates risks and frequent project failures: open source IS development (Lungo, 2008), system for electronic archiving of document (Zejnullahu et al., 2018), ERP (Akeel & Wynn, 2015; Heeks et al., 2010), health information systems (HIS) (Heeks, 2006), change in education process with new software system (Dasuki et al., 2015) and many others.

2.5.4 McKinsey 7s framework

The McKinsey 7S framework is a change management model which was first formulated by business management consultants Peters and Waterman from McKinsey & Company in collaboration with business researchers Pascale and Athos in 1980 (Peters, 2011). The authors define 7 factors that relate to any organisation: structure, strategy, systems, skills, style, staff and shared values (or superordinate goals) (Figure 9) and formulate the application principles. They argue that effective organisational change is a result of strong relation between all 7 elements and it is impossible to achieve adequate results in one area without developing others. Successful strategy should employ all elements as driving forces during the change. As there is no starting or main point in the graph, each node has equal priority and every element becomes critical at a particular point of time (Waterman et al., 1980).

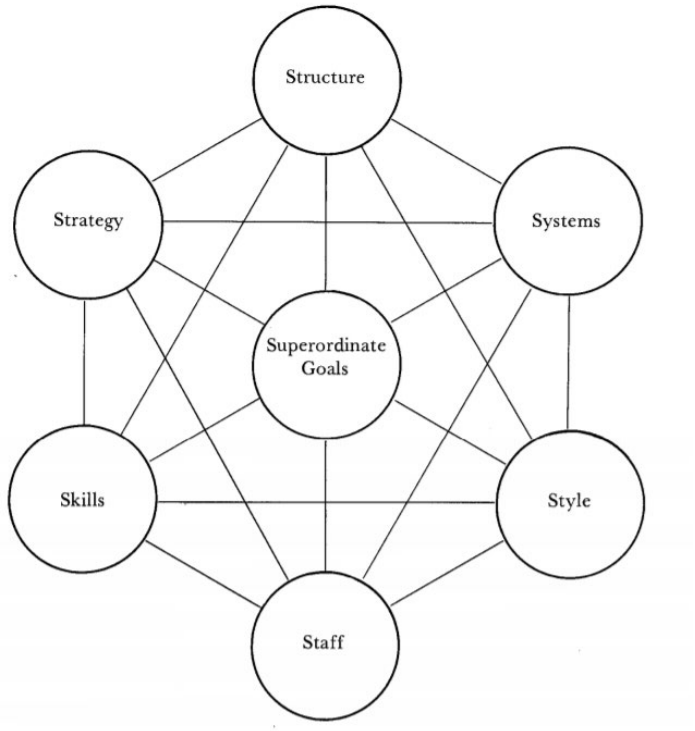


Figure 9. McKinsey 7S framework (Waterman et al., 1980)

The structure, strategy, and systems represent three hard elements of the model which usually well formulated, identified and managed in companies. Other 4s: skills, style, staff and shared values are the soft elements that are less tangible than the hard ones but can have a high influence on the organisation and its competitive advantage (Jurevicius, 2023). All 7 components of McKinsey 7S framework described in Table 1.

Table 1. Elements of McKinsey 7S framework (Waterman et al., 1980)

Element	**Category**	**Description**
Structure	Hard	Size and complexity of the organisation, how centralised it is, hierarchy of business units and their responsibilities.
Strategy	Hard	Plans and activities that aim to support the organisation in a constantly changing environment, improve its position in the market and achieve competitive advantage. It answers the question “how to create a unique value”.
Systems	Hard	Processes and procedures which established in a company and enable its daily activity. It is the central point of every change as it defines how the business operates and how most of decisions are made.
Skills	Soft	Skills represent the major company’s attributes that determine its capabilities and dominance. For each business the skills are unique and may include advanced project management, technology, quality management, product management, financial control and outstanding achievements in other areas.
Style	Soft	The style is usually characterised by personalities of top-managers and represents the way how company is managed by its leaders, how they communicate to employees.
Staff	Soft	This element includes all aspects related to the employees’ compensation, competence and responsibility, training and career development.
Shared values	Soft	The central part of the model that not presented in formally declared strategy or goals. It is a fundamental idea of the business which related to the employees’ ambitions to achieve a certain result.

Since the development, the McKinsey 7S framework is widely used for strategy development, planning a change, effectiveness estimation at both corporate and process level (Jurevicius, 2023).

Business researchers and practitioners apply the model to a new context and combine its elements with dynamic or sequential forms from other frameworks. Spaho (2014) employs the seven elements of the framework to create a new project management framework. Galliers et al. (2003) propose their revised stages of growth model which aims to analyse the organisational change through a set of six maturity levels: from “Ad Hocracy” to “Integrated harmonious relationships”. Each maturity level presented as a structured description of all elements from 7S framework that match the organization development. The revised 7S model provides a consistent view on the IS strategy development and structures various aspects of a complex transition process (Galliers et al., 2003). The original McKinsey 7S framework or its extensions are also used to identify necessary changes at the initial phase of the ERP implementation projects (Hanafizadeh et al., 2011; Shiri et al., 2014), e-Learning system readiness assessment (Alshaher, 2013; Irene et al., 2018).

A focus on various elements of the business, their mutual connection, and importance of each element represent the main strength of the McKinsey 7S framework. It can be applied to any change or issue at an enterprise or lower level when consistent structured view on an organisation is needed. However, unlike the many other models, it ignores the external factors that influence the organisation and, therefore, should be used in combination with other models or methods to perform a successful business transformation.

2.5.5 Google's AI adoption framework

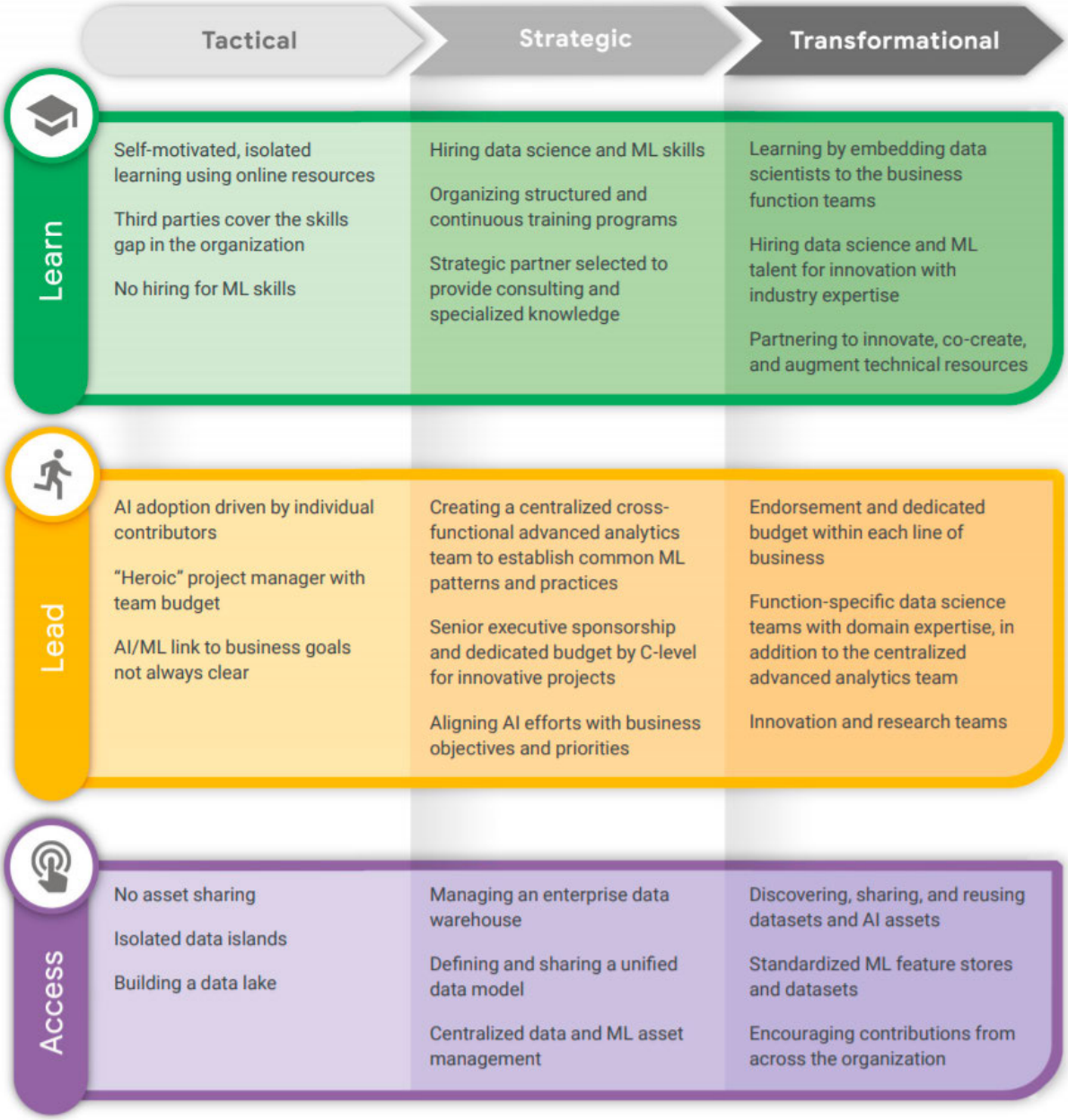
Google Cloud’s AI Adoption Framework is based on the company’s expertise in development AI-powered services and experience of its customers in different areas.

The model aims to support technology leaders in assessing their organization's AI maturity level and establishing respective strategy (Schut et al., 2020).

Figure 10. The AI maturity themes (Schut et al., 2020)

The framework defines four elements: people, technology, process, and data. The links between all these elements is the foundation of the framework represented in six themes: learn, lead, access, scale, automate, and secure (Figure 10).

Further, the authors determine three maturity levels: tactical, strategic, and transformational. These levels and six previously mentioned themes arranged in a two-dimensional matrix that presents the AI maturity scale (Figure 11). This model offers practitioners a clear and structured way to identify their actual state at each of the six layers (themes) and specify the next evolution step.


Tactical
Strategic
Transformational
Learn
Self-motivated, isolated learning using online resources
Third parties cover the skills gap in the organization
No hiring for ML skills
Hiring data science and ML skills
Organizing structured and continuous training programs
Strategic partner selected to provide consulting and specialized knowledge
Learning by embedding data scientists to the business function teams
Hiring data science and ML talent for innovation with industry expertise
Partnering to innovate, co-create, and augment technical resources
Lead
AI adoption driven by individual contributors
"Heroic" project manager with team budget
AI/ML link to business goals not always clear
Creating a centralized cross-functional advanced analytics team to establish common ML patterns and practices
Senior executive sponsorship and dedicated budget by C-level for innovative projects
Aligning AI efforts with business objectives and priorities
Endorsement and dedicated budget within each line of business
Function-specific data science teams with domain expertise, in addition to the centralized advanced analytics team
Innovation and research teams
Access
No asset sharing
Isolated data islands
Building a data lake
Managing an enterprise data warehouse
Defining and sharing a unified data model
Centralized data and ML asset management
Discovering, sharing, and reusing datasets and AI assets
Standardized ML feature stores and datasets
Encouraging contributions from across the organization

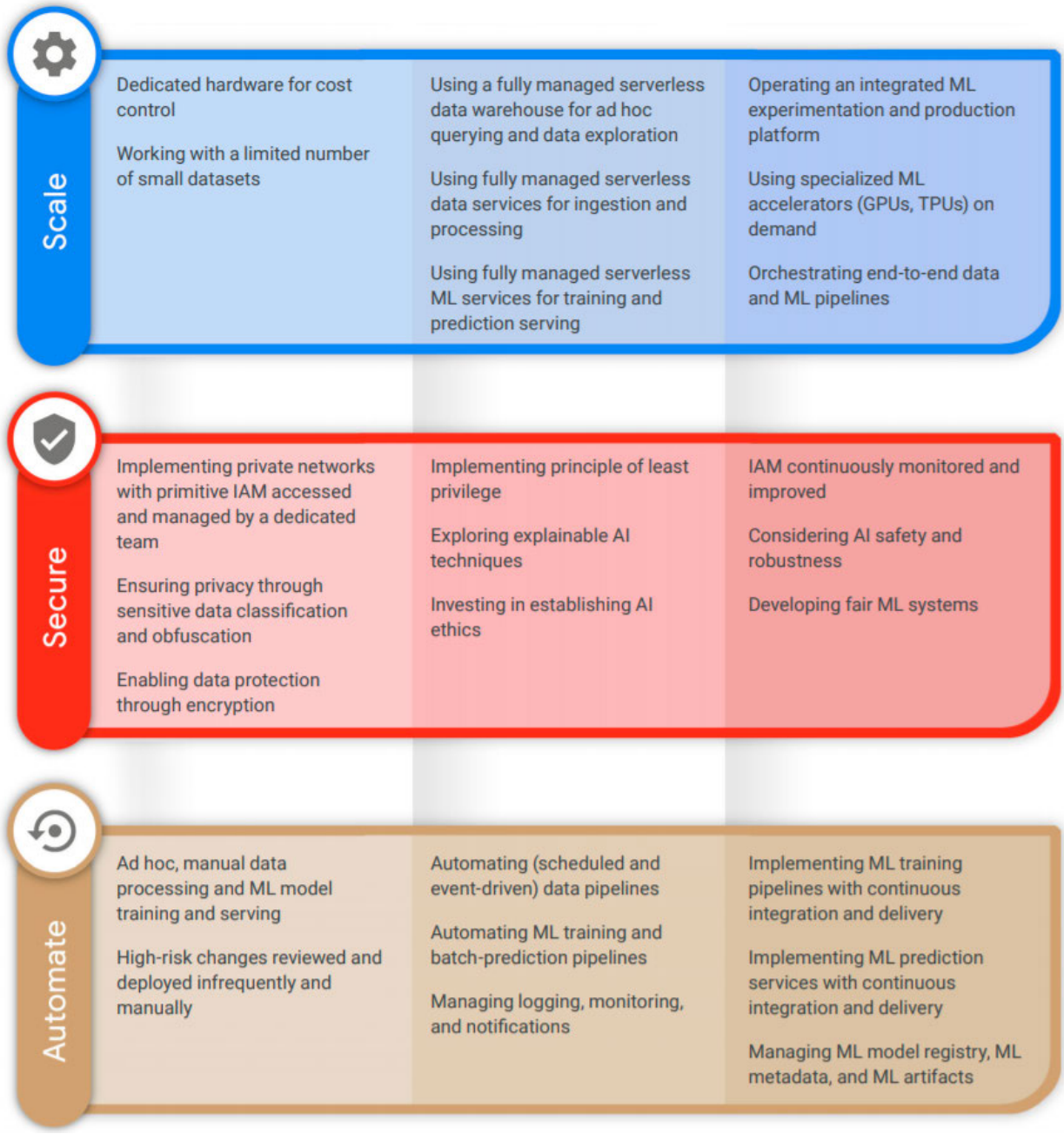


Figure 11. The AI maturity scale (Schut et al., 2020)

The framework serves as a practical guide how to address common problems that companies face when implementing AI-powered solutions. The strong focus on Google Cloud services reduces its flexibility and application area. However, its structure, elements and key statements can be considered in AI implementation projects which

attempt to use a similar technology from another vendor or develop their inhouse solution.

2.5.6 Stage models and software development process

Various stage models popularized by IS researchers or leading IT companies turn any complex project into a sequential process in which project managers can plan and analyse each stage separately. Nicholas et al. (2017) argue that almost every IS implementation project follows four steps:

Step 1: Conception. This stage identifies a need for a change, investigates the problem, performs feasibility assessment, and drafts a provisional solution. It ends with a selection of a service provider or integrator (either internal or external to the organization) that will develop the required software.

Step 2: Definition. At this stage, both integrator and customer (i.e. end-user) perform detailed analysis of the concept, define system and functional requirements that describe the system and necessary features to fulfil the customer's needs. The project manager creates a detailed project plan in terms of tasks, schedule, budget, human and system resources. Then, the appropriate management review the plan and either accept it or request change.

Step 3: Execution. During the execution stage, the integrator develops the information system according to the previously defined requirements. This main, and usually most complex, stage may include interim parts: design, implementation, testing. The target solution is implemented, deployed and becomes available for the users.

Step 4: Operation. This stage starts after technology deployment, when the customer accepts the new service. Operational issues and system maintenance are integrated into normal business activity, and may last for years while the system is functioning. In addition, continuous improvement and system updates are necessary to keep the service "in maintenance" and up to date.

Other popular project management models include similar steps or stages. The Project Management Institute (PMI) identifies four project phases: initiation, planning, execution, and closeout (Blake, 2004), whereas another popular project management methodology, PRINCE2, divides the project development process into the following parts: pre-project, initiation, subsequent delivery stage(s), and final delivery stage (Srivastava, 2021). Although there is no one standard model, project management stage models group all activities into separate phases, where each phase has specific tasks and clearly defined milestones. This can help project teams to plan and control their project, minimize risks, and increase chance for successful launch on time, on budget and to agreed quality standards.

The waterfall model (Figure 12) is a common approach to software development that follows a sequential process. It assumes that complete system requirements can be collected before development begins. The process consists of several phases, and each phase is validated by stakeholders before moving on to the next phase. The waterfall process is irreversible and does not allow the previous phases to be reviewed once they have been completed. The advantage of the waterfall model is its comprehensive approach, which helps to develop a well-integrated and documented system. The involvement of stakeholders at each stage ensures their participation and helps to minimise further complaints. The model is criticised for its long system development process and the risk that requirements may change during development. This can lead to an implemented system that is out of date by the time it is completed (Foster, 2014).

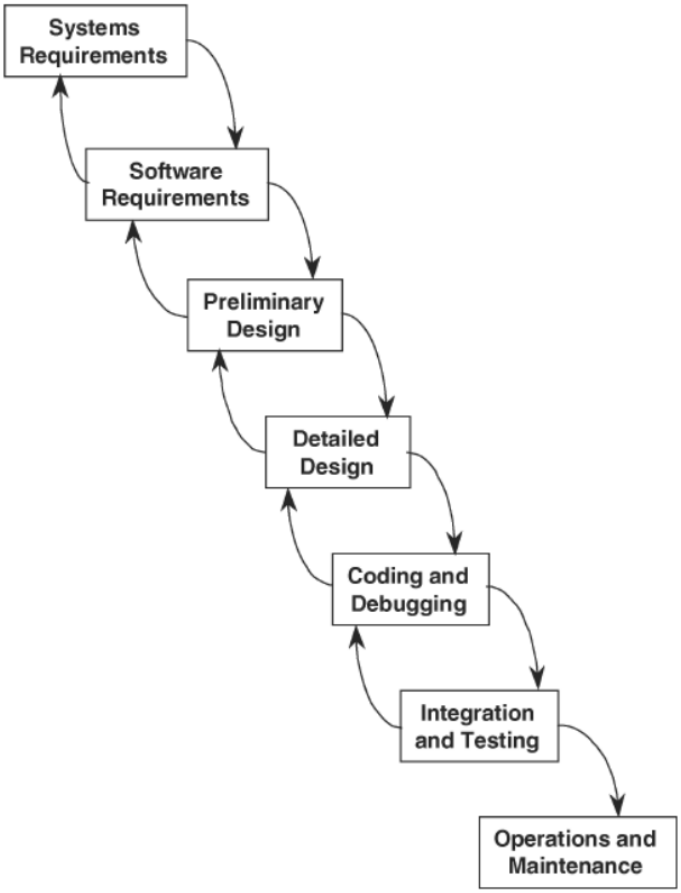


Figure 12. Waterfall model (Buede et al., 2016)

The V-model (Figure 13) is another notable model that represents the system development process in sequential stages. The model was first introduced in 1979, and since the early 1990s has been used as the official standard by the German government for building information systems (Weilkiens et al., 2015). Bröhl et al. (1993) first published a standard for building software using the V-model to a wide audience.

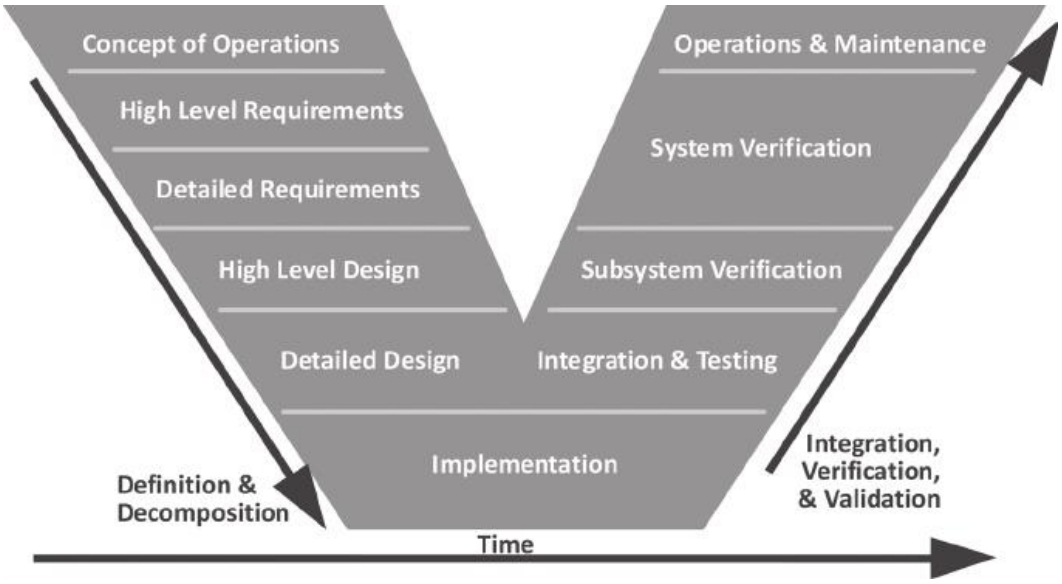


Figure 13. The V-model of the systems engineering process (Elm et al., 2008)

Although the number of phases is not standardised for a given model and may vary depending on how the model is applied, there are distinct phases of concept, requirements, design, implementation, testing, verification, and operational use. The left side of the model and half of the "V" represents the definition of the project. The development of the project goes sequentially from the initial high level and abstract concept phase through to the decomposition of requirements and the detailed design of the system. The right half of the model represents the testing and integration process that follows implementation. A specific feature of the V-model is the horizontal connection between the stages on the left and right sides of the model. For example, testing and integration are carried out in accordance with the production documentation from the detailed design stage, and operation and maintenance are based on the principles formulated in the concept stage (Weilkiens et al., 2015).

2.5.7 Other modern frameworks and their applications

The models described above in the sub-sections 2.5.1-2.5.6. are popular and were used by many researchers since they were developed a long time ago. Their validity is proven, and practical suitability tested in different research areas. However, the

technology is growing fast over the years and companies face new challenges when implementing recent technologies in their business or try to adopt existing solutions in a new cultural or industrial context. Scholars and practitioners successfully apply the existing models to a new context or extend them to suit new requirements. As the number of studies is huge, this sub-section describes only few studies which demonstrate universality, extensibility, and applicability of the models.

Chatbot blueprint presented by Deloitte Digital (Robinson et al., 2017) depicts the approach to planning a chatbot project in Figure 14. The proposed model is organised into seven blocks, which sequentially cover different aspects of the project. These blocks are divided into three levels. The top level corresponds to the first step - defining the purpose of creating a bot and its role in business development. The Customer block defines the portrait of the user and their needs. Relevant Content raises questions related to access organisation and obtaining information necessary to solve user problems using a dialogue interface. The Navigation block is determined by the chatbot user's navigation questions, usability issues, and the list of intents that the planned service will be able to handle correctly. The Businesses fit block combines aspects of the everyday functioning of the chatbot after launch, and how the new service will help the business achieve its objectives. The Learning block helps to answer questions related to the development of the service, receive feedback from users and teach the chatbot. Finally, the Enablers layer addresses the How question and represents issues related to acquiring the necessary skills, estimating time and budget, and finding the right implementation tools.

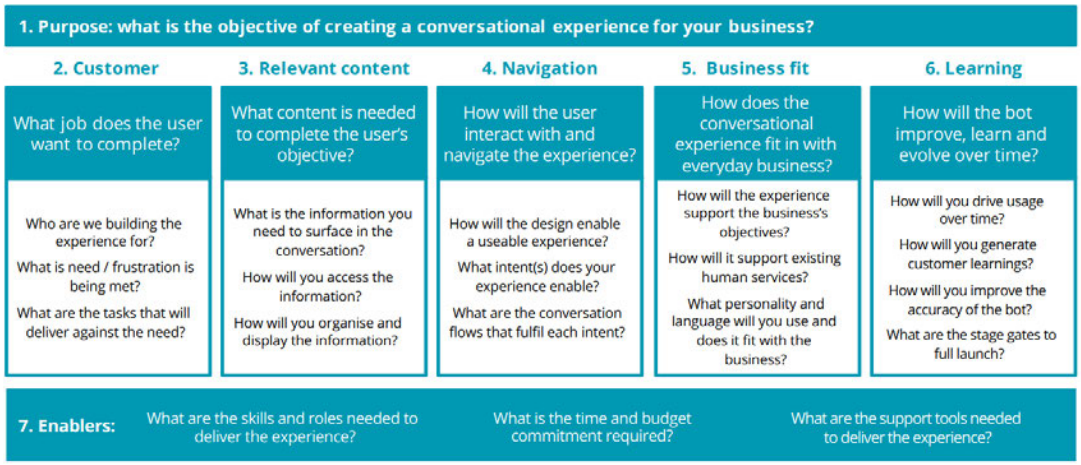


Figure 14. Chatbot blueprint (Robinson et al., 2017)

Similar to Earl's model, the Chatbot blueprint offers a stepwise, top-down approach that starts with defining objectives. The strength of the model is that it focuses on chatbot projects and includes relevant content elements. A significant limitation of the model is its narrow purpose - organising the planning phase of a chatbot project, while leaving the subsequent implementation and launch phases uncovered.

Wynn (2018) performs an analysis of knowledge and technology transfer opportunities that arise from cooperation between universities and SMEs in Europe. The researcher identifies twelve key factors that influence successful technology transfer in every studied project. These factors arranged into three groups: technology, people and process and represent a new generalized model (Figure 15) which can support other university-industry collaborative projects.

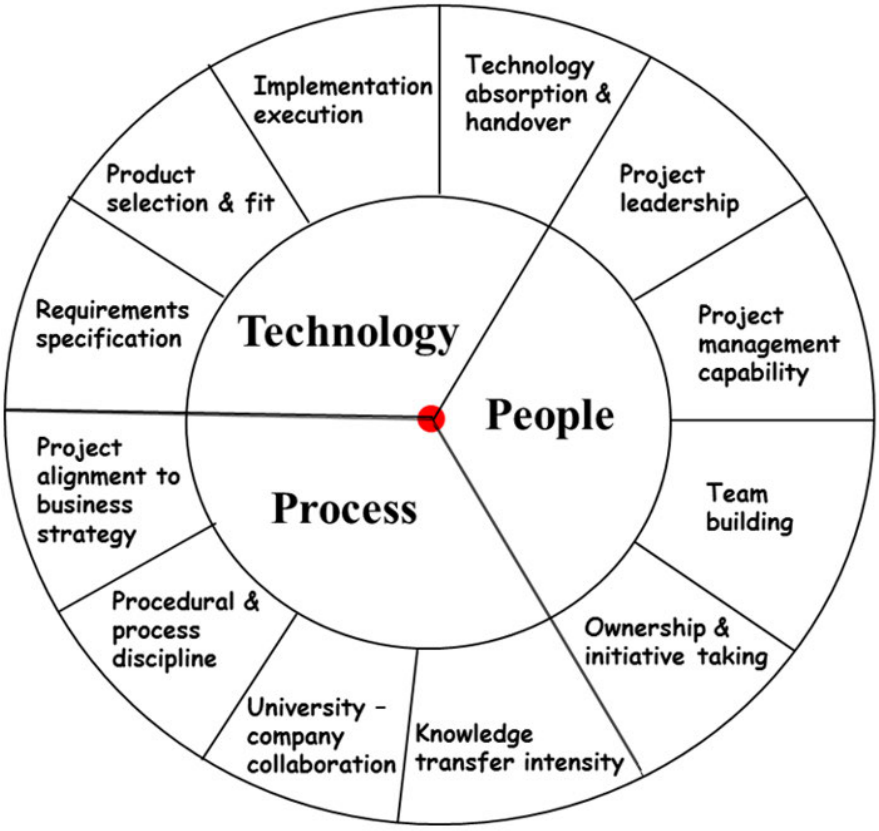


Figure 15. The twelve change factors underpinning successful technology transfer (Wynn, 2018)

2.5.8 Section summary

The models and frameworks discussed in this section represent a variety of approaches and structures. The TOE framework, Heek's model, Earls' model and others have been used in research and practice for decades. The versatility of these models has been confirmed in practice, as has their applicability to AI projects. The reviewed stage models and project management frameworks are also characterised by their versatility and ability to be used for chatbot projects. At the same time, the generality of all these models is also their disadvantage. A review of these models reveals a lack of components that can fully address the challenges specific to chatbot projects.

2.6 Strategic approaches and methods

2.6.1 Choosing between Top-down, Bottom-up, Build or Buy approaches

Artificial intelligence promises significant competitive advantage due to automation of routines and respective labour cost reduction, and the ability to offer a new or enhanced service. Context and technology are essential aspects of successful AI technology adoption (Dasgupta et al., 2019). Dasgupta et al. (2019) propose a tradeoff matrix between top-down, bottom-up, build and buy approaches that can support managers in developing a new AI technology implementation strategy (Figure 16).

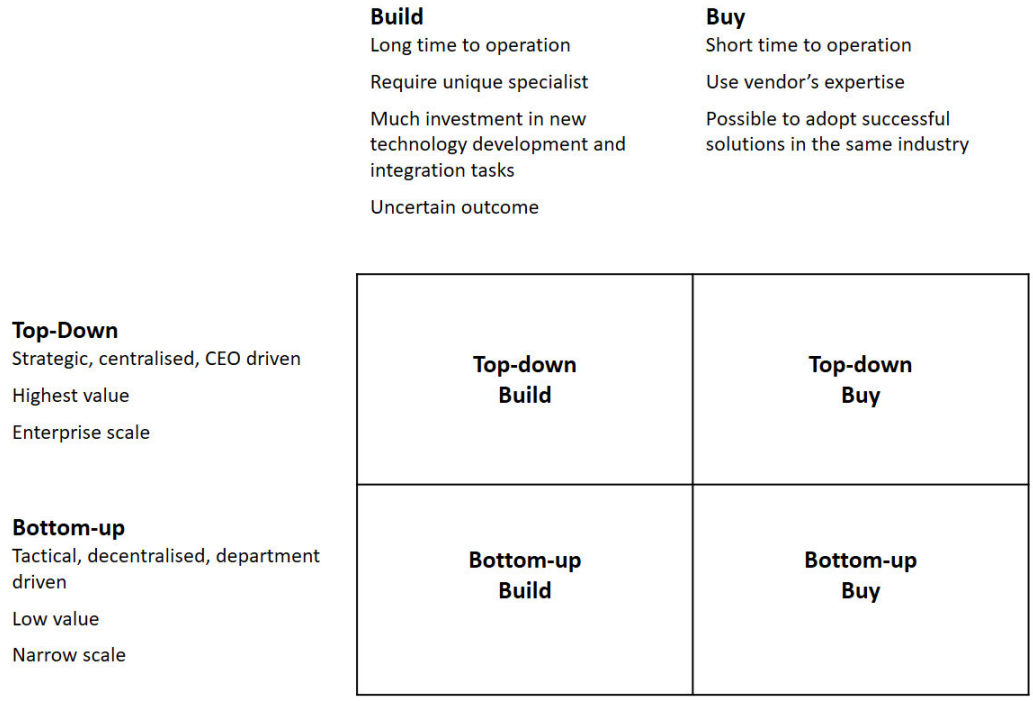


Figure 16. Tradeoff matrix between top-down, bottom-up, build and buy approaches (Dasgupta et al., 2019)

The top-down and bottom-up approaches define the strategic organizational options, which are similar to those introduced by Earl (1989). The question "build or buy?" determines the second dimension that addresses the choice between adopting

technology from a vendor, or investment in an in-house developed solution. The **top-down** approach is a centralised in-depth view of the new technology and its strategic role in the company. Being driven by top management, it focuses on commercial results across different business units and achieving competitive advantage by adopting new technology at an enterprise level. This approach promises the highest business value, but requires significant resources and complex organisational changes that are likely to incur significant risk and take a long period to be fully implemented (Dasgupta et al., 2019).

In contrast, the **bottom-up** approach aims to benefit from the new technology by solving local problems on demand, and incrementally adding new business value. It is a tactical approach that enables the achievement of quick wins, with low risk and investments. The disadvantage is that it does not provide a holistic view of how the new technology can transform the organization. As a result, this approach usually does not provide much business value and fails to achieve competitive advantage, compared with a successfully implemented top-down strategy (Dasgupta et al., 2019).

The **build** approach assumes high investments in staff and technology in order to develop a proprietary in-house solution. If successful, it may lead to a long-lasting and stable result, which cannot be replicated by competitors (Dasgupta et al., 2019). This approach is very complex, resource consuming, and risky. Bughin et al. (2015) surveyed more than a thousand executives, and found that more than two thirds of them concluded that their investments in in-house development did not bring the expected benefits.

Conversely, the **buy** approach enables companies to benefit from new technology adoption through cooperation with external vendors (Dasgupta et al., 2019). AI is a rapidly growing industry that includes various global and local service providers with advanced solutions. This approach is seen as low risk, short time to market, and iterative, and relies on the vendor's resource capacity and expertise. However, the buy

approach is not suitable for ambitious technology leaders that aim to achieve competitive advantage by developing a unique in-house product.

2.6.2 Agile methodologies

In software development, agile methodologies refer to a series of practices, which aim to improve quality in the development process, and enable teams to deliver new functionality faster with a strong focus on actual customer needs. They rely upon collaboration within self-organised teams that deliver work regularly as small but valuable features, sometimes termed “product increments” (Atlassian, 2021).

Since the agile manifesto (Agilemanifesto, 2001) was formulated in 2001, it has stimulated the most remarkable changes in the software development arena (Dingsoyr et al., 2012). Unlike the traditional sequential software development models, like waterfall, the authors of the agile manifesto set out simple but realistic principles and guidelines, which can be adopted by IS development teams. By putting emphasis on individuals within projects teams, and interactions between them, better results can be achieved compared to traditional methods, where formalized processes and detailed planning determine project success. Working software delivered to its users, which was developed in collaboration with them, and accepted by them, is seen as a clear illustration of project success.

Some researchers and software engineers define agile as a philosophy, whereas others develop a practice-oriented approach. Scrum, Kanban, lean software development, feature-driven development (FDD), and many other methodologies derive from the agile manifesto principles and provide software development teams with a consistent set of rules to improve their production process (Dingsoyr et al., 2012). Scrum is one of the most popular agile frameworks used by many companies, which employs an incremental approach, focuses on the interaction between team members, and involves customers in the development process. Many companies worldwide, including leading organisations like Amazon and Google, apply Scrum to achieve high productivity in

developing their new products and services. Scrum assumes that the software development process is chaotic, and requirements always change. It provides effective tools to control this difficult to predict activity, and turn frequent change requests into new product features (Sutherland, 2014).

Frequent changes, unpredictable results, rapidly changing contexts are an integral part of the modern software development process. The complex nature of AI projects, difficulty in formulating requirements and need to experiment, require a project management approach, which enables teams to avoid the bureaucracy of the traditional engineering methodologies. Agile methodologies respond to this challenge by establishing adaptive and incremental processes with a strong focus on communication between the people involved (Abrahamsson et al., 2008).

2.6.3 MVP method

Lean Startup is a popular methodology for developing new businesses, services, or software products. It adopts an agile philosophy and builds upon certain elements of lean software development. The MVP (Minimum Viable Product) approach is an essential element of Lean Startup, which can be defined as a "version of a new product which allows a team to collect the maximum amount of validated learning about customers with the least effort" (Ries, 2009, August 3, para.3). The main idea of this approach is to build the core functionality of the product, deploy it and get it used by early adopters as soon as possible. Customer knowledge and a focus on their needs from the very early phase of a project, can help to minimise the risk of failure, and support necessary adjustments in product characteristics and business goals as a project progresses (Ries, 2011).

Chatbot projects are characterised by a high degree of uncertainty in the early stages, the unpredictability of the outcome and the need to study user feedback in order to define new requirements. This is why many IT integrators who regularly implement chatbots in organisations support the use of the MVP method in their projects. Bansal et

al. (2019) argue that companies should grow their service from the basic form continuously improving its functionality by adding new features, integrations and skills moving towards the advanced level. This approach is supported by others who argue that MVP method should encourage teams to design, develop and launch a quick pilot version of a chatbot which enables to research customers outcomes (Franke, 2018; Guenole et al., 2018; Overend et al., 2019). Once the first version with the core functionality is in operation, continuous improvement and optimisation activities start. They usually include customer feedback and behaviour research, AI models training and improvement, planning and adding new features incrementally, provide training to improve user adoption.

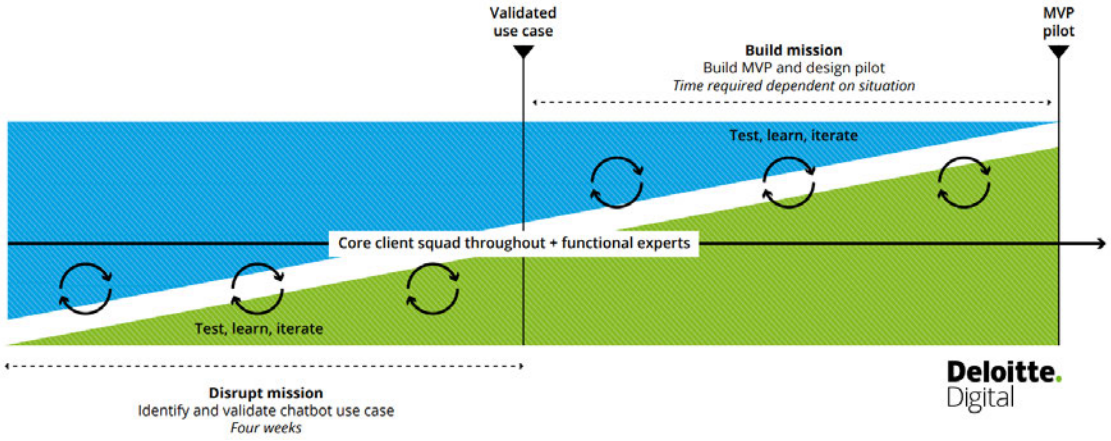


Figure 17. A rapid process to define, validate, and test chatbot use cases (Robinson et al., 2017)

Robinson et al. (2017) develop the idea of using MVP in chatbot projects by offering a rapid incremental process to define, validate, and test chatbot use cases which is schematically illustrated in Figure 17. The development of the first version of the MVP (pilot product) consists of two phases, the Disrupt mission and the Build mission. In the first phase, which lasts only four weeks, the team must create the chatbot and test the idea with users. The purpose of this step is to quickly validate the use case with users before investing heavily in developing a full service. If the initial hypothesis is successfully confirmed, it is advisable to move on to the second, longer phase, during

which the team must develop and launch the first version of the working chatbot (MVP). Test-learn-iterate loop continues through the implementation process, encouraging the team to obtain regular feedback from end users and then adapt the product requirements accordingly.

2.6.4 Section summary

A review of the methods and strategic approaches to implementing chatbots shows that organisations need to make strategic choices that can have a significant impact on the subsequent success of the project. The decision to develop a chatbot in-house or buy a platform from a vendor depends on a number of criteria, including the desire to achieve leadership through a virtual assistant and the availability of the necessary resources and skills. Agile software development methodologies are commonly used by teams implementing and developing a wide range of software. They are becoming popular because of the need to manage projects in an environment of unpredictability and frequently changing requirements. This is a characteristic of projects using AI, and therefore a number of authors argue for the use of agile methodologies for such projects. The MVP method also suggests developing and launching a chatbot iteratively, continuously improving functionality, and collecting and measuring feedback from users.

2.7 Summary

Interest in chatbot technology has been growing over the last decade, with the number of successful chatbot applications increasing and the quality and complexity of solutions improving. The technology is becoming more accessible and efficient, attracting more interest not only from researchers but also from businesses. This is supported by the active development of AI and NLP algorithms, especially the latest LLM models. In recent years, this development has accelerated, especially with the appearance of the OpenAI family of GPT models, which have demonstrated pioneering

abilities to solve a wide range of problems with a quality that is sometimes indistinguishable from the result of human work (GPT-4, 2023).

Companies are now looking for AI-powered solutions that can offer them intelligent tools to interact with their customers. Customers' behaviour in social networks, transaction history or recent communication with a brand, should be aggregated in digital profiles. Data accessibility, fluency, and consistency are crucial and require cross-functional collaboration of sales, marketing, customer service and other teams within organizations (Oracle, 2016). Leading technology companies, like Google, IBM, Microsoft, and many others, are supporting the chatbot boom and offer powerful cloud solutions that are aimed to help their customers. Their product descriptions introduce various AI-powered features and promise quick deployment and intelligent bot behaviour that solves actual business problems. Ease of connection, to distribution platforms and popular instant messengers, is the essential feature that makes quick time to market for these products feasible (Lebeuf et al., 2018). Among the companies that offer platforms and technical solutions for creating chatbots, there are no clear leaders, the market is very fragmented and represented by a large number of players focused on different niches. The Gartner report (Revang et al.,2022) only mentions the most prominent representatives, after which it can be concluded that there is no best platform for creating chatbots, and that choosing the right solution is a complex process that must take into account many factors associated with the projects of each individual company.

The thorough analysis of scientific publications that concern the theoretical and practical aspects of the implementation of a chatbot in various types of organizations obtains partial information for addressing the ROs. This points to the key gap in the literature that this research addresses: namely, the absence of extensive and comprehensive information about the challenges and critical success factors associated with chatbot projects, as well as a methodology or framework that reflects these and

offers a practical approach to implementing a chatbot in an organisation, taking into account the specifics of the chatbot implementation process.

The review includes analysis of publications from leading consulting companies and IT integrators, whose statements and conclusions are based on extensive practical experience in the implementation of chatbots. The challenges most companies face when integrating chatbots into their business are similar. They usually relate to the difficulty of solving the problems of integrating information systems and exchanging data between systems. Issues related to user adoption of the new technology, as well as various problems related to natural language processing and understanding user intentions, are also serious obstacles for companies. A range of internal and external corporate regulatory constraints, data security policies and technical challenges can be addressed, but have a significant impact on the system architecture of chatbot systems.

A review of the factors that companies should consider in order to implement a chatbot successfully shows that companies should pay particular attention to the strategic planning of the project, the formulation of objectives and metrics; explore the applicability of the dialogue interface to their business problem. The platform and vendor selection process is crucial. The platform must be able to integrate with existing systems and meet security and compliance requirements. In addition, the chatbot should provide personalised, efficient service and be designed with a distinctive personality. Regular performance evaluation, algorithm training and the use of a human operator fallback option improve the quality of the chatbot. Regular collection of user feedback and continuous improvement help to iteratively develop the chatbot service according to user needs. An exhaustive list of the critical success factors identified during the literature review is provided in section 3.2, where it is used as a forming element of the conceptual framework.

The authors of numerous publications and scientific studies offer a variety of operational models and frameworks that help form a structured approach to the implementation of new technologies, especially AI projects and chatbots. Such universal

new technology adoption and change management models as TOE, Heeks, McKinsey 7s and others are popular among researchers and are successfully used to implement new technologies, including chatbots. There are other more specific and recent models, such as Google Cloud's AI Adoption Framework and the Chatbot Blueprint model, which have a narrower focus on AI and chatbot adoption. A review of these models allows the researcher to identify a number of common approaches and patterns that can be used in this study to form a conceptual framework and then design a new operating model for the successful implementation of chatbots, which is the aim of this study. Stage and project management models, such as Waterfall and V-model, add a project management and software development perspective to chatbot implementation. They have a similar step-by-step view of the process of creating a new system, which includes the research and concept phase, requirements definition, implementation, and the operations and maintenance phase. Agile methodologies, the MVP method and an iterative approach to chatbot development are suggested by experts and practitioners as an effective way to create a chatbot under conditions of high uncertainty, as well as a way to achieve the best result when creating a software product by identifying user needs and measuring the effectiveness of new functionality.

3 Conceptual framework

3.1 Introduction

A conceptual framework is an important component which provides the researcher with a logical structure of the concepts, ideas, and relationships that are relevant to the study. It also helps researchers to establish relationship between the research problem, selected paradigm, and methodology in order to strengthen the consistency of the research design (Camp, 2011; Maxwell, 2005). According to Miles et al. (2014), who focus on qualitative studies, conceptual frameworks may be presented either in graphical or narrative form.

Crawford (2020) identifies three main factors that may underlie the formation of frameworks: experience, literature, and theory. Even though the personal experience of the researcher cannot be the only and full source for formulating the conceptual framework, in this study the experience of the researcher is the essential source of motivation for conducting research and achieving the ROs. The proposed structure and content of the conceptual framework is largely based on the findings of the researcher's previous work on the topic (Skuridin, 2022). A comprehensive overview of publications (provided in Chapter 2) that are directly related to the implementation of chatbots, as well as broader topics about new technology adoption models, project management methodologies and other related topics, form the basis for the conceptual framework. This chapter describes the process of the conceptual framework formulation, which consists of various theories and knowledge presented in the literature. Together they form an integral graphic structure filled with key meanings which helps the researcher in this study to design the research process and streamline the data collection and analysis processes.

3.2 Critical success factors for chatbot projects

The researcher explored the numerous experiences of other researchers or practitioners in the literature review (see Chapter 2) in order to find the most suitable approaches that have proven themselves well for solving problems in related fields. An overview of the challenges faced by companies implementing chatbots showed that most of the difficulties and failures are related not only to aspects of project management, but to a wide variety of other reasons. These reasons may be external or internal to the organisation, and have a technological, social, or other nature. The team's ability to overcome these challenges greatly increases the project's chances of success. The approach of critical success factors, formulated by Bullen et al. (1981) and well-proven in practice, was selected as a suitable and universal method for identifying and formulating success components that have diverse sources.

From the literature review, success factors for chatbot projects were identified (Table 2). This list starts to address the RO2 and partly answers the question: what are the main CSFs evident in the extant literature for successful chatbot implementation? The information is presented in the form of recommendations, according to which teams implementing chatbots can increase their chances of success by improving their work in various areas, including project management, user experience, technology application, etc. When including factors in this list, no analysis of their relevance by industry or business function was performed, so they are general. This is necessary because these statements are then used in the conceptual framework, discussed with respondents, clarified and their importance confirmed or challenged.

Table 2. Success factors identified from the extant literature

No.	Success Factor
1	Identify use cases and assess suitability of using conversational User Interface (UI) (Franke, 2018; Henke et al., 2016; Sengupta & Lakshman, 2017)
2	Focus on one business objective (Bakhshi et al., 2018; Robinson et al., 2017)
3	Analyse integration capabilities of the selected platform (Bakhshi et al., 2018; Franke, 2018)
4	Define business value metrics aligned to the organisation strategy (Franke, 2018)
5	Consider security and compliance requirements (Srinivasan et al., 2018)

6	Explore vendor options in selected industry field and locality (Bakhshi et al., 2018)
7	Analyse build and buy approaches to define the strategy (Dasgupta & Wendler, 2019)
8	Use the buy (not build) approach and explore your local vendors (Dasgupta & Wendler, 2019)
9	Choose a platform that can provide detailed reports about chatbot performance (Bakhshi et al., 2018)
10	Offer users an option to chat in their favourite messenger and provide multiple messenger support (Sengupta & Lakshman, 2017)
11	Apply agile iterative approach and MVP method (Bakhshi et al., 2018; Henke et al., 2016; Robinson et al., 2017)
12	Design an experience that provides value for both to the customer and business (Robinson et al., 2017)
13	Use information about the customers to offer personalised service (Bughin et al., 2017; Fokina, 2023)
14	Focus on chatbot productivity. The ease, speed, and convenience of using chatbots is vital. Bots should solve users' problems in a more efficient way than any other communication channel (Brandtzaeg & Folstad, 2017; Robinson et al., 2017).
15	Use entertainment elements and social interaction elements for additional motivation (Brandtzaeg & Folstad, 2017)
16	Design chatbot personality (Franke, 2018; Isbister & Nass, 2000; Katz, 2019; Liew & Tan, 2016; Robinson et al., 2017; Ruane et al., 2021; Sengupta & Lakshman, 2017; Smestad, 2018).
17	Evaluate performance and identify which requests were not processed properly (Bakhshi et al., 2018; Robinson et al., 2017)
18	Invest time and resources in bot training (Bakhshi et al., 2018; Overend et al., 2019; Robinson et al., 2017)
19	Blended communication enables excellent service. Switch dialog to a human when a bot can't handle a user's request (Drift, 2018; Fokina, 2023; Sengupta & Lakshman, 2017)
20	Create dashboard that displays key chatbot performance metrics (Robinson et al., 2017)
21	Study the users' needs by collecting feedback and plan new features accordingly (Franke, 2018; Robinson et al., 2017)
22	Continuously improve the chatbot by applying recent AI technologies (Robinson et al., 2017)
23	Advertise bot's capabilities to its users (Franke, 2018)

The list of CSFs identified as a result of the publication analysis was compiled as follows. Each publication included in the sample was analysed to identify and document factors that influence the success of the implementation and launch of chatbot projects. The lists of CSFs obtained from the review of each publication were further combined into a single aggregated list. Since the same idea can be formulated differently by different authors, similar statements from different authors were combined into more general, universal formulations. These transformations were carried out based on the judgement of the researcher using the procedures described in more detail in section

4.7. The result of this grouping and aggregation is Table 2. The items in this list are not sorted and their order does not reflect their importance or other characteristics.

The variety of factors suggests that the success or failure of chatbot projects is related to a range of issues concerning new technology adoption, resource availability, vendor and platform selection, software licensing and implementation costs, as well as organisational and project management aspects. A smart and friendly virtual agent that solves users' problems in an efficient way was seen as vital for chatbot success. User motivation, and special chatbot characteristics and tactical activities to enhance customer service, were also seen to be of significance. These success factors can help guide companies in chatbot implementation projects, but their impact on projects may vary.

3.3 A conceptual framework for chatbot projects

The use of the critical success factors approach is an important starting point in formulating the conceptual framework. However, the list of factors presented in Table 2 does not constitute a definitive set of tools that can be used in the research. As mentioned above, the reasons for the success of a chatbot implementation can come from many different sources. Organizing the critical success factors into an ordered structure by categorizing or grouping them according to the source of the success factor or other criteria, is the next step that can define the framework's logical structure.

To address this problem the researcher considers various popular and proven models for adapting new technologies, change management, knowledge management, and project management methodologies (Section 2.5). The TOE framework, Earl's model, Heeks' model and McKinsey's 7s framework are popular tools that have been used successfully for decades to support management of innovation and change in organisations. They share a universal strategic approach that breaks down the complexity of change into smaller categories. The TOE framework, the McKinsey 7s framework and Heeks' model emphasise that successful change in an organisation or the introduction of a new

technology is possible if the team equally considers the importance of factors from each category presented in the model. Their flexibility is both an advantage and a weakness, with criticism that these models are too general and mostly applicable to large organisations. For this reason, many researchers and practitioners use these models in combination with other models, and it is this approach that is appropriate for this study.

The use of Heeks' model in this study may not be justified, as this model has worked well in studies at the level of large organisations or communities, whereas a project to implement a chatbot within an organisation tends to be a more local phenomenon. Among the disadvantages of the McKinsey 7s framework listed in 2.5.4 is the limitation of the model that comes from focusing exclusively on the internal elements of the organisation, ignoring external factors. At the same time, the list of chatbot implementation challenges presented in section 2.3, as well as the CSFs in section 2.4.4, indicate that for the successful implementation of a chatbot, it is necessary to take into account a large number of external factors, such as regulations, local availability of technologies and vendors, competitors, and so on.

Adopting the structure of the TOE framework in this study is more appropriate because of its universal and simple structure, which provides the necessary approach for categorizing the sources that impact the chatbot implementation projects. This framework is widely applied in new technology adoption, digital transformation, and chatbot related studies. Given the flexibility and proven efficiency of this framework, it is used in this research in modified form to categorise the critical success factors in chatbot implementation projects. Most of the success factors listed in Table 2 can be assigned to Technology or Organisation, and thus the Environmental element is excluded in the following framework, as only a few factors from this group are known, and the ability of them to influence chatbot projects is relatively low, compared with the Technology or Organisation factors.

Brandtzaeg et al. (2017) argue that productivity is the most significant chatbot criterion that relates to a positive user experience and willingness to return. Productivity does

not only mean an immediate response or efficient use of labour. In a chatbot context, this term relates to the ability of chatbot developers to design their virtual agents to effectively focus on a user problem. Ideal bots are able to solve user's problem more efficiently than a human assistant, website, mobile app, or another communication channel. Here then, "User Needs" are seen as a logical third set of factors that influence chatbot design and ultimate success, supporting teams in developing productive solutions to meet user expectations. To summarise, along with the Technology and Organisation, User Needs is adopted as a third group of factors which influences the decision-making process in a chatbot implementation project.

Wynn's (2018) twelve change factors model is an example of a visual organisation of multiple factors into three categories, and can be used in conjunction with the TOE. However, for displaying a much larger number of factors, as in this study, the tabular structure of Google's AI adoption framework is more appropriate for the conceptual framework.

Chatbot projects, like many other new IS implementations, undergo certain similar phases. Long before the start of implementation, the business customer and the project team formulate objectives, explore potential vendors and their platforms, trying to choose the most appropriate ones for their company. The implementation itself usually begins with an analysis and definition of requirements. This is followed by the development and implementation of the software product, release into production and maintenance. Every project stage can be characterized by a certain set of the most important events and key actions that the team takes. Thus, for each stage there are corresponding critical success factors, that positively influence the success of a particular stage, as well as create the prerequisites for successfully solving the problems later. Indeed, analysing the preliminary list of critical success factors obtained from the literature review (Table 2), it can be concluded that many of them are relevant to a particular stage of a project. Therefore, classifying the critical success factors

according to their relationship to the various phases of the project can bring a project-oriented view of the ordering of the conceptual framework elements.

The various stage models reviewed in section 2.5.6 similarly represent the process of developing and implementing an IS in the form of successive stages. Project management methodologies such as PMI and PRINCE2 provide a universal set of tools for managing projects, including chatbot implementation projects. According to them, the project lifecycle consists of several phases, from initiation to final delivery and closeout. A similar representation of a project in terms of successive phases can be found in the software development models: Waterfall, V-model, and stage model by Nicholas et al. (2017). The number of phases in each model is not strictly defined and can vary. However, as with project management methodologies, each phase is characterised by specific actions and tasks that must be completed in order to move successfully to the next phase. The advantage of the four-step project lifecycle model proposed by Nicholas et al. (2017) is its simple structure, which can be easily integrated into the structure of other models. This model does not contradict other stage models, but rather is a more general and universal representation of them. It divides the chatbot implementation process into four sequential phases - Conception, Definition, Execution, Operation - which have interim objectives and well-defined characteristics. Since this model is relatively simple and universal, and its steps are reflected in many other project methodologies, it can enhance the conceptual framework, bringing an important project management aspect in its structure.

Ultimately, the use of existing models provides the following features: a modified TOE framework helps to classify the various sources that influence chatbot projects, and the stage model is an alternative way to classify these sources. Both models are independent views on the classification of critical success factors. They feature different dimensions, have a linear structure, and therefore can be easily combined into a simple tabular form. A combination of the modified TOE framework and stage model concept of Nicholas et al. (2017) is depicted in Figure 18. The rows of the table are represented

by the main categories in terms of areas that affect chatbot implementation projects: Technology, Organization, User Needs. The columns of the table correspond to the most common phases in terms of the project life cycle noted above (Conception, Definition, Execution, and Operation). The CSFs listed in Table 2 are represented in Figure 18 as (CSF-1..CSF-N). Each of them can be assigned to a specific cell that best characterises that factor in terms of its source (row) and the stage of the project (column) on which it has the greatest impact. The process of transforming and categorising the list of CSFs from Table 2 into an organised tabular structure is shown schematically in Figure 18.

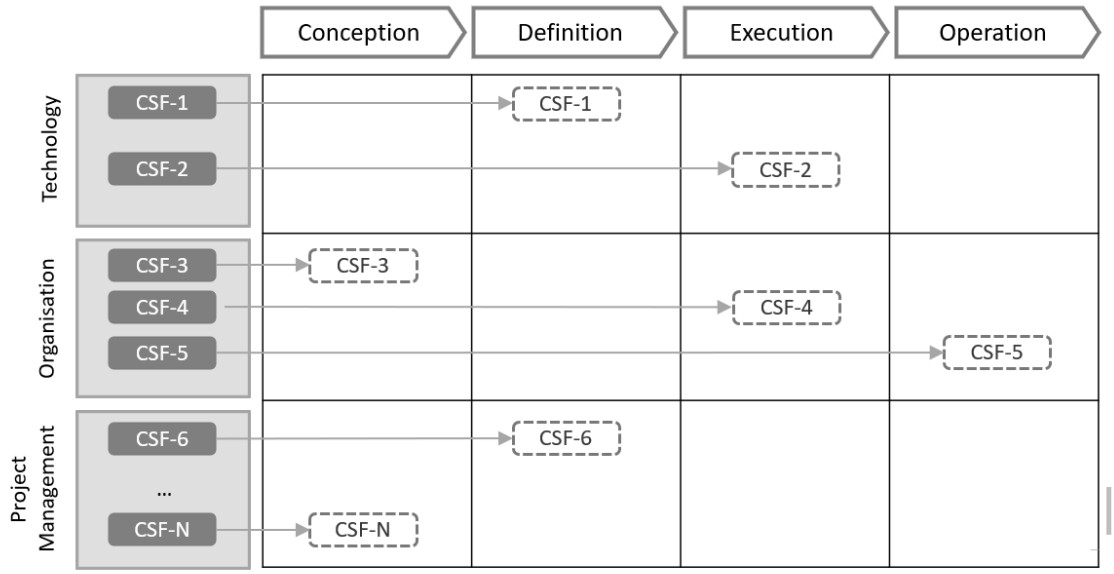


Figure 18. Outline model for successful chatbot implementation (illustrative schematic)

The result of applying the described transformations of the CSFs from Table 2 into a two-dimensional structure is shown in Figure 19. Each CSF is assigned to one of the three categories (Technology, Organisation or User Needs) and the corresponding project stages, which together form the resulting conceptual framework.

	Conception	Definition	Execution	Operation
Technology	Analyse build and buy approaches to define the strategy Explore vendor options in selected industry field and locality Analyse integration capabilities of the selected platform Choose a platform that can provide detailed reports about chatbot performance	Consider security and compliance requirements Offer users an option to chat in their favourite messenger and provide multiple messenger support	Create dashboard that displays key chatbot performance metrics	Continuously improve the chatbot by applying recent AI technologies
Organisation	Identify use cases and assess suitability of using conversational User Interface Focus on one business objective Define business value metrics aligned to the organisation strategy	Apply agile iterative approach and MVP method		Invest time and resources in bot training Advertise bot's capabilities to its users
User Needs		Design an experience that provides value for both to the customer and business Use information about the customers to offer personalised service Apply blended communication approach	Focus on chatbot productivity. The ease, speed, and convenience of using chatbots is vital Use entertainment elements and social interaction elements for additional motivation Design chatbot personality	Evaluate performance and identify which requests were not processed properly Study the users' needs by collecting feedback and plan new features accordingly

Figure 19. Conceptual framework for researching chatbot implementation

Analysing the content of the resulting structure, it can be noted that the preliminary list of critical success factors is distributed more or less evenly over the cells of the table. The organization in the table clearly demonstrates that each of the four phases of the implementation of the chatbot corresponds to several success factors that are most significant at a particular phase. It can also be seen that each of the selected sources of the factors (Technology, Organisation, User Needs) has an impact on the project at each

project phase. Therefore, it can be expected that the process of exploring new critical success factors and the refinement of existing elements can be efficient and convenient when using the proposed framework.

3.4 Summary

The conceptual framework is based on the critical success factors approach, which helps companies to formulate a strategic approach to adopting new technology and to plan tactical steps for implementing chatbots. An analysis of the experiences of various authors researching chatbots or leading companies implementing chatbots in various organisations produced a preliminary list of critical success factors (Table 2). Using a modified TOE model, widely used for adopting new technologies, three main sources of influence on the project were identified and the factors categorised according to these: Technology, Organisation, User Needs. Next, the four stages - Conception, Definition, Execution, Operation - from the stage model, proposed by Nicholas et al. (2017), add an important building block in terms of project management and project life cycle. As a result of combining the two models into a two-dimensional structure and assigning the identified critical success factors to a relevant cell within this structure, the researcher proposes a conceptual framework (Figure 19). This framework provides the basis for the primary case study research, through which its structure, elements and listed success factors are analysed, refined, expanded and validated.

4 Research methodology and design

4.1 Introduction

Following this brief introduction, the philosophical position of the researcher is set out in section 4.2. Then, the chosen approach and methodology, as well as the most appropriate strategy, are discussed in sections 4.3 and 4.4. This information represents the philosophical and methodological choices made by the researcher and explains how the selected framework enables him to approach the research problem. Next, in sections 4.5 and 4.6, two selected data collection techniques are presented and discussed - interviews and observation - and the data collection procedures used to analyse this data are outlined in section 4.7. Results validation and research quality are discussed in section 4.8, and the ethical issues that arise as a result of the selected research framework are considered in section 4.9. Finally, section 4.10 provides a summary, which is a brief overview of the entire chapter. It describes the elements of the research design, and explains how they link the aim with the philosophical position, research methods, strategy, and data collection and analysis techniques.

4.2 Research philosophy and paradigms

Saunders et al. (2016) define research philosophy as a consistent set of assumptions that underpin methodological choices made by researchers and shape the overall process of developing new knowledge. According to Tsoukas et al. (2003), there is no one best philosophy to conduct research. At the beginning of a research process, it is crucial to identify a link between philosophical position and research practice. By adopting a research paradigm, business and management researchers must be aware of related methodologies and how they plan to interpret their findings (Gill et al., 2014). In addition, the philosophical position depends on the ability to undertake experiments, collect and process necessary data with respect to a research subject and the interests of stakeholders (Saunders et al., 2016).

Every researcher must identify a link between his philosophical position and related methodology (Gill et al., 2014). By conducting research, he or she makes a series of assumptions about human knowledge, reality, and personal influence on the process (Saunders et al., 2016). These philosophical choices determine the possible selection of the research methods and strategy that enable researchers to undertake the experiment and interpret collected research data (Crotty, 1998).

The metaphor of the "Research Onion", proposed by Saunders et al. (2016), depicts the researcher's choices, ringed in blue in Figure 20, made according to his epistemological position and selection of the methodology and strategy.

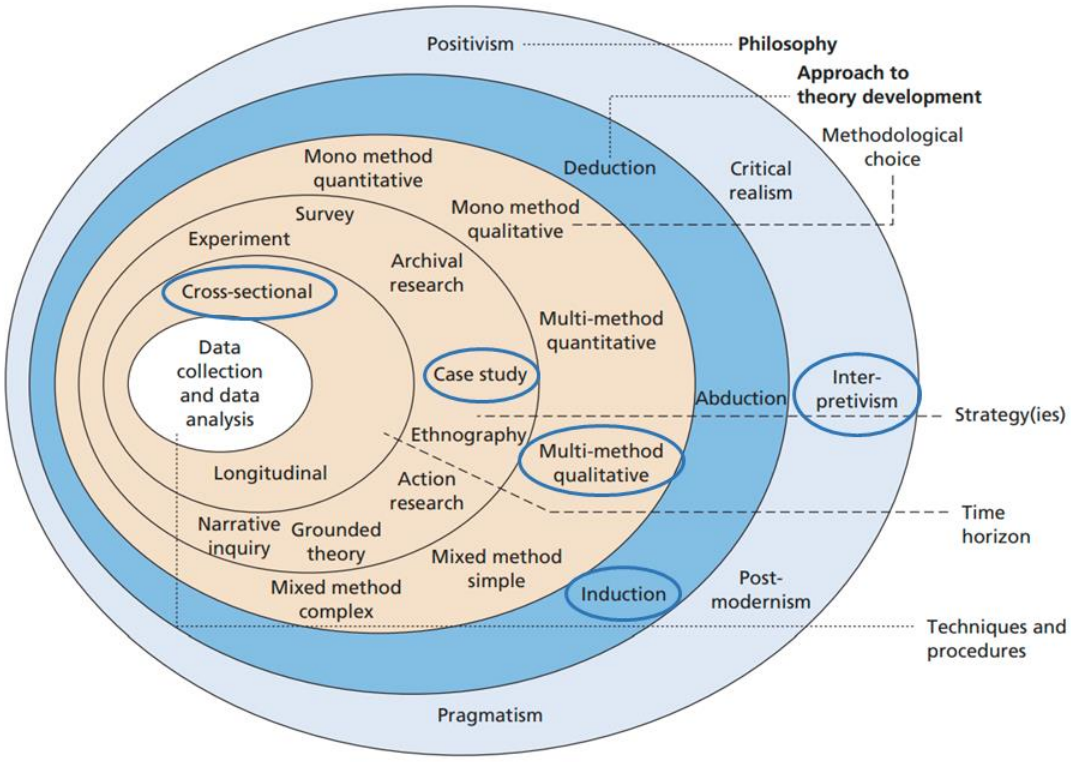


Figure 20. The research onion (Saunders et al., 2016) and researcher's selected options

Ontology groups assumptions that explore the nature of reality and examine research objects. In business practice, these objects usually include people, events, organizations, system, and other entities (Saunders et al., 2016). While ontology

attempts to answer what is reality, epistemology refers to assumptions that study how to know reality (Crotty, 1998). Ontological and epistemological assumptions tend to complement each other and define a research paradigm. In the business and management area, researchers usually adopt different epistemologies depending on their context and knowledge they aim to legitimate (Saunders et al., 2016).

According to Saunders et al. (2016), there are five paradigms in business and management: positivism, critical realism, interpretivism, postmodernism and pragmatism. Interpretivism and positivism are common paradigms that present a different set of assumptions that can be made by researchers. Being driven by scientific methods, positivists believe that their knowledge is precise and absolute. They avoid humans' opinions, beliefs, and judgments that are always subjective. Instead, they rely on facts and knowledge obtained scientific way. A positivist researcher remains independent from the research object and avoid influencing data collection process (Crotty, 1998). In contrast, interpretivists focus on human beings and state that social behaviour cannot be studied in the same way as a world of physical events and objects. People create meanings that heavily depend on their religion, culture, education, ethnicity, or actual circumstances. Interpretivists aim to study these meanings and do not attempt to find universal rules that can be applied to everyone. Interpretivist researchers avoid seeing general laws in their research but focus on discovering complexity of social phenomena. New knowledge can be obtained through observation of social context and respective interpretation. In business research this usually means to explore organization by analysing experiences of employees with different roles. Executives, IT specialists, call centre operators, customers, and other groups look at their organization from their own perspective and produce meaningful knowledge. In addition, business segment, customer profile, cultural environment and many other aspects that make organizations unique are interesting to an interpretivist researcher (Saunders et al., 2016).

By adopting the interpretivist philosophy, the researcher attempts to observe the chatbot integration process within the selected organization. The new understanding of the problem can be obtained through the analysis of unique experience of the people involved in the project. The selected paradigm offers a suitable research structure and methods to apply qualitative methods of analysis and undertake deep investigations in order to address the ROs.

Meaningful interactions between the researcher and key stakeholders produce rich and complex data to be used for interpretations. The researcher does not attempt to find the absolute truth about the chatbot implementation process or create the ideal framework. However, the selected paradigm helps him observe the problem in an isolated environment, analyse situation in a whole, and discover the complexity through communication with different groups of people that may have different interests (Saunders et al., 2016). Personal opinions of involved participants are subjective and vary depending on their role, culture, interest in the project, or other factors. For instance, when defining success criteria of chatbot implementation, a CEO may focus on commercial aspects while IT specialists will pay more attention to robustness or service availability. Such diversity in opinions represents the key interest for the researcher in relation potential findings and creation of theory. Interpretivists assume that their personal position is an integral part of the research process and also subjective. Being a part of the research process, the observer may affect the stakeholders and tend to interpret the research materials according to his own beliefs.

4.3 Research approach and method

Saunders et al. (2016) describe deduction and induction as two opposite approaches to theory development. Business researchers usually choose a deductive approach when their research starts with a defined theory and aims to test this theory. Research data is collected to estimate a hypothesis in relation to the existing theory. In contrast, in his study the researcher aims to develop a theory from findings obtained during a chatbot implementation process. Therefore, inductive approach is more applicable because it

requires a theory definition as a result of observation and data analysis. The research includes data collection concerning chatbot implementation experience of practitioners that have relevant experience with chatbots in the past. Personal views, criticism, and beliefs of individuals involved in the study represent essential data that is used to explore the phenomenon and develop rules for the new chatbot implementation framework or model.

Researchers make their methodological choice by using a qualitative or quantitative method, or a mixed method that represents a combination of both. Although the difference between the qualitative and quantitative methods in some studies may be vague, it is important to understand their origin and characteristics. Quantitative study traditionally relies on the positivist paradigm when researchers work with numerical data and use appropriate data collection techniques such as questionnaires or structured observation in combination with quantitative procedures. In contrast, the qualitative method is mostly used in interpretive studies that process non-numerical data and involves social observation, interactions with participants and requires researchers to act in a real business context. Action research, case study, ethnography, and some others are the strategies that are primarily associated with this method. Depending on the selected strategy, qualitative research intends to use different data collection and analysis techniques to process relatively small data samples that contain subjective beliefs of participants. Qualitative studies typically use an inductive approach to theory development when researchers explore phenomena by collecting sometimes non-structured data, to interpret findings and generalize the results into a new theory (Saunders et al., 2016).

4.4 Research strategy

The strategy layer, which follows the methodological choice on the research onion (see Figure 4.1), depicts common strategies that establish a link between epistemological position, methods, and data collection techniques (Denzin et al., 2011). Most of the research strategies can be used with either quantitative or qualitative methods. For

instance, researchers may use observation to conduct quantitative research however with some limitations due to difficulty in obtaining large data samples and the inability to exclude the influence of observers on the recorded observations. In such a case, this strategy may support a researcher at some secondary research stages while the main study uses another more appropriate strategy. Conversely, in a qualitative study, an observation becomes a fundamental strategy that generates research data to be processed by using appropriate analytical techniques (Silverman, 2013).

According to Saunders et al. (2016), experiment and survey strategies are associated entirely with the quantitative methodology, whereas ethnography, action research, grounded theory, and narrative inquiry can be used in qualitative studies only. Archival research and case study can be either a part of a quantitative or qualitative study but can also be used with the mixed method.

The selection of strategies in combination with previously defined methodology must present a coherent research design that helps researchers to achieve the research aim (Saunders et al., 2016). The practical phase of the research involves the researcher in a chatbot implementation process for observation and collaboration. This part is a qualitative study that is based on interpretive philosophy and supports the author in selecting appropriate strategy for the project. A case study enables him to perform an in-depth study of the social phenomenon in an existing company environment (Yin, 2014) and obtain necessary research data to meet the ROs.

The use of two data collection techniques, survey and observation, within a single case study to collect various sets of qualitative data means that the qualitative multi-method will be a feature of the research. When choosing a time horizon for the case study, the options are to explore phenomena in a particular time (cross-sectional study) or to analyse a process of change over a long period (longitudinal study) (Saunders et al., 2016). Even though the chatbot implementation process is long and may require one year or more time from the project start to launch, this study is cross-sectional. The researcher attempts to obtain knowledge from participants at a particular moment

when they are being interviewed and most likely when they have completed a certain procedure and ready to discuss their fresh experience.

Case study is a common research strategy among scientists as well as practicing specialists and its popularity is continually growing. Case studies enable researchers across different disciplines to perform an in-depth inquiry that helps them to understand the complexity of a phenomenon and create new knowledge about it. The term “case” in business research may refer to a company, department, business process, change process, group of employees, or specific person (Yin, 2014).

The possibility to study a case within a real-life context is a key feature of this research strategy. Similarly, a survey strategy explores a problem in a real-life setting, but its potential to create a new understanding is very limited due to standardized response format and other restrictions that relate to a quantitative methodology. The popularity of case studies in different research areas is due to their flexibility and applicability. They can support researchers in interpretive or positivist studies, use an inductive or deductive approach to theory development, and be used for exploratory, descriptive, and explanatory purposes. Many interpretivists choose a case study and use an inductive approach to analyse research data, establish patterns to modify the existing theory, disprove it or create a new one (Saunders et al., 2016).

Every case study needs to identify a unit of analysis or answer the question “what is the case?”. In a classic study, a “case” usually refers to an individual like a student, patient, etc. A person, event, implementation process, organizational transformation are common examples of a unit of analysis in business research. The correct selection of the unit of analysis depends on the research questions that demonstrate the main interest, context and define constraints (Yin, 2009). The chatbot implementation process in a company represents the unit of analysis that is linked to the ROs and research design described in this essay. The author explores a business process as a “case” which scope is limited to a company that aims to implement a bot for its commercial purposes.

Depending on the number of studied domains, Yin (2009) describes a single case that refers to a research work associated with a single organization. Multiple case studies aggregate several cases when each case produces similar results that can be replicated. Another case study classification dimension mentioned by Yin (2009) incorporates holistic and embedded studies. The holistic design of a single case study explores a whole organization or a business unit when there is no need to observe separate processes in different units as different phenomena. In contrast, embedded research examines different organizations, departments, groups, or other structures that belong to one case study but require individual view and analysis due to their special setting and context. Although the multiple case studies lead to a stronger position and better generalizability, the single case does not necessarily produce worse results and was selected by the author consciously with respect to the available resources and agreement achieved with the organization. Also, the selected case is a reasonable choice for a single case study because it is "representative or typical … among many different projects" (Yin, 2009, p. 48) and the theory developed from such a case can be applicable in a similar context. The holistic design suits the researcher's needs because there is no reason to split the organization into subunits and study the case from different perspectives. The chatbot service intends to communicate with customers on behalf of the company according to the predefined business logic and rules. Each stakeholder in the project may have his or her aim related to the chatbot performance depending on a role within the organization. However, they assume that the bot is a holistic service that automates communication between the company and its customers.

Research evidence in a case study can be obtained from various sources. Yin (2009, p. 99) describes six main data collection techniques that include documents, archival records, interviews, direct observation, participant-observation, and physical artefacts. However, he argues that the researcher's choice is not limited, and using various data sources within a case study can significantly improve the quality of the research data. In this study, the personal experience of specialists participating in the chatbot

implementation project represents the most significant interest in terms of the content's size, variety, completeness, and quality. That is why an interview is the most appropriate way to address ROs and obtain insightful responses from respondents directly. Being a part of the project team, the researcher is involved in the integration process and has the opportunity to observe the phenomenon and obtain necessary research data. Thus, observation is the second equally important source of evidence in the case study, which complements the evidence obtained through interviews.

4.5 Data collection: interviews

An interview is a conversation between two or more people in which the interviewer usually asks questions to the respondents and receives answers from them. During the interview, interviewees usually share their attitudes to the research phenomenon, talk about their personal experiences and express their opinions. In most cases, the result of the conversation is recorded on a video camera or a voice recorder, saved as text notes or in another suitable format that allows later transcription of the result and use of the data in research work (Gray, 2014, p. 382).

Many researchers argue that interviews are a very powerful research technique and source for collecting case study evidence. They are especially effective in exploratory studies, which analyse individual feelings and beliefs of respondents and enable researchers to focus the conversation on a case study topic and ask "why?" questions to obtain insightful information about research phenomena (Gray, 2014; Yin, 2009). Despite the strengths of the interview, several challenges are inherent in them. The quality of the result can vary greatly depending on the personality of the interviewer, his or her ability to conduct a conversation, the environment, as well as the planned scenario of the conversation. The result may be biased due to a poorly worded question, misheard or misunderstood interviewee's answer. It is also vital to ensure a high level of trust between the participants and avoid expressing the interviewer's opinion so that the respondent is ready to speak critically if necessary and does not tend to agree with

the interviewer (Yin, 2009). Researchers should consider all these challenges when designing interviews to minimise bias and ensure high-quality research data.

There are three common types of interviews that researchers choose among depending on the objectives of their research, the necessity to follow a strictly defined list of questions or vice versa, and the desire to hear unexpected but essential details from the respondent. Structured interviews require strict adherence to a pre-prepared script. Although there is an opportunity for the respondent to express his position relatively freely, this type of interview does not allow participants to dive into a topic they may find interesting if it is not planned in the interview script. In semi-structured interviews, a script is more like a guide for the interviewee, who prepares a series of topics to discuss, but it is not necessary to follow the format. At the same time, a predefined set of topics and questions allow researchers to make a comparative analysis of the results, identify similar opinions of different respondents, and see where they have disagreements. Finally, the most flexible and informal type of interview is unstructured interviews. There is no script, and the interviewer cannot predict what exactly will be discussed in the conversation. His or her main task is to provide the respondent with the opportunity to tell the story, and to describe as many details as possible about the topic is being discussed. Transcribing and analysing such interviews is a complex task, and the result is highly dependent on the focus of the researcher, his or her aim and how the collected data is processed (Garner et al., 2013).

In this study, the researcher employs semi-structured interviews as the most efficient data collection technique, which helps to achieve the research aim. The list of topics and structure of questions prepared in the script directly address issues related to RO1 and RO2. The interviews enable the researcher to undertake this exploratory study in which chatbot experts and practitioners answer a pre-defined list of questions, the answers to which form the basis for formulating a new model for implementing chatbots. At the same time, the researcher is interested not only in getting short answers and general conclusions but uses the selected data collection method to ask

in-depth questions. During conversations, respondents have the opportunity to recall their recent experiences, think about why certain events took place, and imagine what could be done better to integrate the chatbot more effectively.

The interview script consists of two sections directly related to RO1 and RO2. In the first part, the researcher asks the question, "What are the main challenges which companies face when implementing chatbot projects?", finding the answer to which is the first research objective RO1 (Figure 21). Further, in the same section, the respondent is asked to discuss actions which companies could perform to overcome the just mentioned challenges. This information is used to complement the previously given answers. It helps to formulate the main points used in the second part of the interview, which aims to identify the critical success factors in chatbot implementation projects.

Section 1. Challenges which companies face when implementing chatbot projects		
Area	**What are the main challenges which companies face when implementing chatbot projects?**	**What are the actions which companies could perform to overcome these challenges?**
Factor related areas:		
Technology related		
Organisation related (Strategy, Structure, Employees, Communication, Project management, etc)		
User needs and chatbot performance related		
Other:		

Figure 21. Semi-structured interview script. Section 1

Respondents answer the question in the context of the three proposed areas: technology, organization, and user needs, which are proposed in the conceptual

framework in Chapter 3. Using this structure helps interviewees to focus on the suggested categories to remember their experiences step by step, delve into the topic, and describe many important details. Following this template is not mandatory; the answers can be presented in any order. Ideas and thoughts that do not fit into any of these three categories are being noted in the specially provided "Other" box.

Section 2. Critical success factors for successful chatbot implementation				
What are the critical success factors for successful chatbot implementation? *Please name success factors in relation to the project phase and category and discuss respective actions which help companies to achieve mentioned objectives.*				
	Conception	**Definition**	**Execution**	**Operation**
Technology				
Organisation				
User Needs				
Other				

Figure 22. Semi-structured interview script. Section 2

In Section 2, following the RO2, the interviewees answer the question, "What are the critical success factors for successful chatbot implementation?". The script structure of this part is entirely consistent with the conceptual model described in Chapter 3. The respondents name success factors concerning the four project phases (Conception, Definition, Execution, and Operation) and three categories (Technology, Organisation, and User Needs) and discuss respective actions which help companies to meet their objectives (Figure 22). Using the conceptual model as the basis for conducting interviews helps participants focus on all the most important topics for research and form the interview transcripts into a single structure, which can significantly improve the quality of processing and analysis of the research data.

Prior to the interview sessions, the respondents receive two documents. The first of these, the Interview Brief (Appendix 1), describes the background of the research, participants and their roles, research purpose, and explains the selected methodology.

This document also contains an interview script that the respondent can review in advance and prepare if they wish. The second document is the Consent for participation in a research interview form (Appendix 2), which both the interviewer and the interviewee sign before they start their conversation. It contains the main terms regarding the ongoing research, the principles of anonymity, confidentiality, and the possibility of refusing to participate at any time.

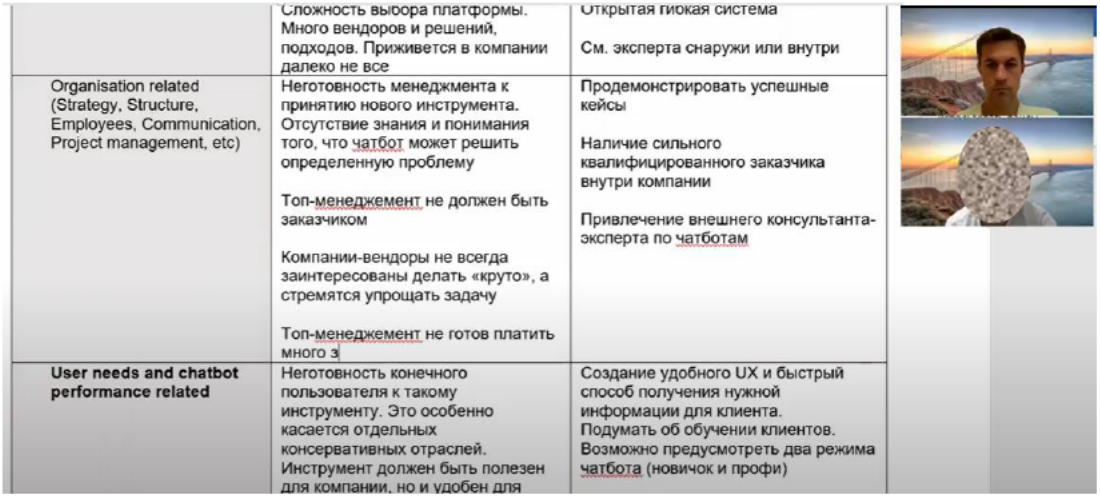


Figure 23. Interview conducted using video conference software

The average interview session lasts 1-2 hours and is conducted remotely using virtual conference software Zoom or Microsoft Teams (Figure 23). At the beginning of the conversation, the researcher reminds about the main objectives of the study, topics to be discussed and the terms that the interviewee has already familiarised himself or herself with. Next, the participants discuss the topics prepared in the script, which helps them organise their conversation, but it is not necessary to follow its format. Using the screen share feature, the researcher demonstrates his screen so that both participants can see the interview script, the question being discussed, and the notes the researcher takes while listening to the respondent. At the same time, the respondent has the opportunity to read and check the notes on the screen, if necessary, report the need to supplement or correct them. The result of the interview is a transcript that contains the

answers to the questions from the script, the related opinions and statements of the respondent, which are organised in a predetermined structure.

There are 15 respondents in total taking part in the study. Eight are direct participants of the chatbot implementation project in ESteelCo (internal interviewees). When selecting respondents from among internal participants, the following selection criteria are used:

1. The presence of previous experience in chatbot implementation projects in one of the leading roles as a project manager, analyst or IT developer.
2. Direct participation in the chatbot implementation project at ESteelCo in all its phases, from the development of the concept to the launch of the chatbot and the start of its operation. The respondent must actively participate in all phases of the project as a manager, analyst or IT developer.

A suitable respondent is one who fully meets one of the criteria and partially meets the second criterion. Among all ESteelCo employees, as well as employees of the IT integrator company who were involved in the project and meet the selection criteria, there are eight participants who have agreed to take part in the study. Also, one of the employees who met the selection criteria refused to participate.

The other seven interviewees are external experts from various banking, IT, retail and pharmaceutical companies in Russia, China, and Germany (Table 3). When selecting external respondents, the following criterion is used - previous experience of direct involvement in two or more completed chatbot implementation projects for large or medium enterprises in one of the leading roles of project manager, analyst or IT developer. The involvement of external experts is intended to increase the sample size of the study and improve the quality of the research data. The interview script assumes that internal and external participants should rely on their experience gained in any chatbot-related projects. Their judgments should be universal, not related to a specific project, but, on the contrary, applicable to most similar chatbot implementation projects in companies. The chosen approach, which incorporates experienced internal and

external specialists with various technical, industry and cultural backgrounds, significantly enhances the chosen research design, creates the prerequisites for generalizability of the research results and formulating a universal model for managing chatbots projects.

Table 3. List of interviewees

Interviewee code	Job title	Industry	Country	Interview language	Internal or external
Interviewee01	Project manager	Metallurgy	Russia	Russian	Internal
Interviewee02	Project manager	IT integration	Russia	Russian	Internal
Interviewee03	Analyst	Metallurgy	Russia	Russian	Internal
Interviewee04	Analyst	Metallurgy	Russia	Russian	Internal
Interviewee05	Senior Marketing Manager	Pharmaceutical	Germany	English	External
Interviewee06	Business Processes Director	Pharmaceutical	Germany	English	External
Interviewee07	Project manager	Banking	Russia	Russian	External
Interviewee08	Product owner	Metallurgy	Russia	Russian	Internal
Interviewee09	Analyst	Metallurgy	Russia	Russian	Internal
Interviewee10	Marketing director	Metallurgy	Russia	Russian	Internal
Interviewee11	CRM director	Online retail	Russia/China	Russian	External
Interviewee12	Director	Metallurgy	Russia	Russian	Internal
Interviewee13	IT Director	Online retail	Russia	Russian	External
Interviewee14	IT Director	Fintech	Russia	Russian	External
Interviewee15	IT developer	Online retail	Russia	Russian	External

The interview is conducted in two languages. English is used to communicate with German-speaking respondents, and notes are also kept in English. The conversations with Russian-speaking respondents used the original script with questions formulated in English. However, the discussions of questions and answers is held in Russian and interview transcripts use the Russian language. The researcher carries out a subsequent translation of the transcripts from Russian into English.

4.6 Data Collection: observation

In many situations, observation is one of the most convenient and efficient ways to collect research data. It is used when the research aims to study the behaviour of people working in a group or organization. It is based on the process of observing individuals, which consists of viewing, describing, interpretation and analysis of events in which a researcher usually is involved (Kumar, 2014; Saunders et al., 2016). This method complements the interview and is selected by the researcher to study not only the participants' personal beliefs but also their behaviour and interactions throughout the chatbot implementation project.

Kumar (2014) defines participant observation as a type of data collection technique when a researcher belongs to a group of viewed people and is involved in the process which is being observed as a phenomenon. The observation process used in this research is of this ilk because the researcher works in the organization and participates in the chatbot implementation project as a team member. Non-participant observation, on the contrary, assumes that a researcher is not a part of the observed phenomenon but views participants and their activities from the side.

Saunders et al. (2016) define participant observation types based on two criteria. Depending on whether the observer reveals the true goals of his participation, the observation can be overt or covert. Another criterion is related to the degree of involvement of the observer in the activity or process that is the subject of observation. He or she can either be involved in the action or observe from outside. Given these two criteria, four types of participant observation are possible, which have their own characteristics:

- **Complete participant**. The identity of the researcher is concealed, and he or she takes part in the activity. This form of participation is most justified when the studying topic may be sensitive to the participants. In these cases, cooperation with an observer may seem undesirable or even risky to the members of the observed group, which will have a significant impact on their behaviour and bias

the results of the study. There are potential ethical issues associated with this form of participation, as the observers may view the observer as a spy. The researcher must carefully consider the ethical risks and avoid any form of harm to any research participant.

- **Complete observer**. Like the complete participant, the complete observer acts openly, but is not a participant in the observed action. He or she observes from the side, by being close to the object of observation, or by using available technical means that allow one to examine the details of what is happening and to obtain the necessary research data.
- **Observer-as-participant**. In this role the researcher acts openly, the participants are aware of the research and its aim. If necessary, the observer may interact with the participants to obtain data, but this interaction should not have a significant impact on the observed action.
- **Participant-as-observer.** This form of observation implies that the observer is a participant in the observed action, and others are aware that research is being carried out, the objectives of the research are known to them. This form of participation is often used in business research when the researcher is an employee of an organisation or a student intern. The researcher used this type of observation in this study, which is explained by his work at ESteelCo and participation in the chatbot implementation project in this organisation. The advantage of being directly involved in the project is the possibility of obtaining a large amount of information related to the observed action. The observer can record, store, process and interpret project documentation, meeting minutes, decisions, work correspondence and other artefacts and actions as a member of the project team implementing the chatbot. By experiencing the entire process of implementing a chatbot from start to finish with the project team, the observer gains extensive knowledge and understanding of the process of implementing a chatbot. The potential influence of the observer on the participants in this project is minimal. The project participants are aware of the

ongoing research and its objectives. At the same time, each of the participants understands that the outcome of the study (whatever it may be) cannot have a negative impact on any of them in the context of the organisation and beyond. Thus, all participants in the observed action behave in the same way as they would behave if there were no observation.

The researcher employs a narrative approach to record research records, which according to Kumar (2014), is characteristic of a qualitative study. Working in the project team, the researcher observes the phenomenon of chatbot integration by performing daily tasks and goes through all the stages of creation, from preparing a concept to launching a completed service. Significant daily events are recorded in the form of short notes, which are further expanded and presented in a narrative form by the researcher with his interpretation and conclusion. He assumes that although this approach is effective and provides insightful and meaningful information, bias in the researcher's position is inevitable. That is why observation is used as a secondary data collection technique, which supplements the findings obtained from the semi-structured interviews.

Narrative recordings are classified into sections and groups according to the structure of the conceptual framework (Chapter 3). The same approach is used for the interviews described in Section 4.5 above, in which all entries are divided into two sections. Thus, the recordings assigned to the first section represent essential data needed to meet RO1 and describe the main challenges which the team faced when implementing the chatbot and what actions could be taken to overcome these challenges in future. The second section arranges all the entries that, according to the author's findings, list the critical success factors that teams should consider when implementing chatbots in practice. This information contributes to the findings used to achieve RO2. Such a standardised universal approach helps the researcher to form the recordings into an organised structure of the conceptual framework and link the described events to the

predefined project phases. It also ensures the comparability and complementarity of the findings obtained during the interview and observation.

4.7 Data analysis techniques and procedures

Applying the inductive approach, the researcher formulates a new theory through a consistent progress from the obtaining the research data to its analysis and interpretation of the findings. Saunders et al. (2016) argue that this is not an easy approach to qualitative research. For its successful implementation, verification and intermediate analysis of the data obtained throughout the study is required. This allows adjustments to the initial plan and makes subsequent data collection work more focused on meeting the objectives of the study. A thorough literature review, a preliminary analysis conducted at an early stage of the study, and a detailed formulation of the conceptual framework (Chapter 3) predetermine the approach to data collection and analysis in this study. During the data collection process, it enables the researcher to focus his activity on obtaining meaningful information that confirms, expands, or corrects previously obtained knowledge. Preliminary data related to the research objectives found during the literature review is enriched by information obtained from interviews and observations. Further, the most complete data set is used for analysis and discussion, followed by the formulation of the results which address RO1, RO2, and RO3.

The Data display and analysis technique is suitable in inductive studies (Miles et al., 2014) and used in this research as a systematic approach to analyse and process qualitative data. This process consists of three analysis activities that can be performed in parallel.

First, the process of **data condensation** is used to simplify, categorize the data obtained, as well as to reduce its overall volume. In this study, data condensation is applied in interviews where the interviewer uses a pre-prepared template and, together with the interviewee, writes down the key statements and conclusions of their conversation.

Long arguments, detailed explanations and unexpected thoughts that come to the mind during the interviews are formulated in the form of short and concise answers which address the ROs. Next, Miles et al. (2014) describe **data display** as a process that is necessary to prepare the received data and present it in a convenient form to identify patterns and relationships, perform comparisons, and identify meanings that are essential for an exploratory study. The form of tables and lists employed by the researcher is the simplest and effective way to display the findings. Finally, **drawing conclusions** as a formalized process that is using the qualitative data collected, according to Miles et al. (2014), is possible due to the effective data display.

The procedures used for data analysis for each RO are outlined below.

RO1: Main challenges which companies face when implementing chatbot projects.

Data analysis related to RO1 begins with the preparation of data obtained during the interview. The answers of each interviewee to the question "What are the main challenges which companies face when implementing chatbot projects?" form individual sets of challenges for each research participant. These are lists of short and concise formulations and their categories (Technology, Organisation, User Needs) that are obtained after pre-processing of interview transcripts. Further, the individual lists in are combined into a single list of challenges, which is schematically presented in Table 4. Wordings of the interviewees that are identical or close in meaning are grouped into single elements, their authors are listed in the "Mentioned by" column. The list is completed with a quantitative attribute, which is filled for each entry in the Score column and reflects the importance of the element.

Table 4. List of challenges (schematic example): output format after interview data pre-processing

No.	Challenge	Category	Mentioned by	Score
1	Challenge 1	Technology	Interviewee 1 Interviewee 3 Interviewee 4 Interviewee 10	14

2	Challenge 2	Technology	Interviewee 1 Interviewee 6	4
3	Challenge 3	Organisation	Interviewee 2 Interviewee 4 Interviewee 7	7
4	Challenge 4	Organisation	Interviewee 2	5
…				
N	Challenge N	User Needs	Interviewee 3 Interviewee 10	3

Score is calculated as follows. For each interviewee, his or her experience level is assigned from 1 to 3, measured in points, according to the Table 5. Further, for each element of the list of challenges, the Score is calculated as the sum of points of the interviewees, who are listed in the "Mentioned by" column. For example, Challenge 2 in the Table 5 is mentioned by the interviewees 1 and 6. If Interviewee 1 is an expert (3 points) and Interviewee 6 is junior (1 point), then the Score is calculated as 3+1 = 4.

Table 5. Interviewee experience levels

Interviewee experience level	**Description**	**Points**
Junior	Junior employee with a little chatbot experience	1
Specialist	Senior specialist or project manager with little chatbot experience but with solid project management and new system integration background	2
Expert	Chatbot expert. Managers with solid experience in integrating chatbots in large companies	3

Thus, using different weights of responses provided by participants with different background better presents the results because this enables consideration not only of the frequency of mentioning statements, but also of the experience of their authors. Obviously, junior specialists who participate in the chatbot implementation project for the first time, and also have little practical experience in implementing other

information systems, may express superficial or even irrelevant conclusions. On the other hand, among the interviewees there are experts who have many years of experience in implementing chatbots in large companies. Their insights, based on stories of personal failure and success, are of far greater value to this study. This approach also allows the researcher to set a cut-off threshold at the analysis stage to exclude from the result single statements of junior specialists that are unlikely to represent good quality conclusions that can be applied in other projects.

Some authors consider it reasonable to use quantitative methods to process and analyse qualitative data as part of the coding and categorisation process. Yin et al. (2018) describe various coding techniques, which include both qualitative data coding and quantitative calculations, to group and categorise findings by calculating the frequency of occurrence of textual data. Tenny et al. (2022) argues that "quantifying qualitative data certainly is possible" and provides an example of a qualitative study in which the factors mentioned by the respondents are rated and ranked. This quantifies the importance of each factor identified in the study. Arthur and Rhode Island College (2021) describe the procedure for processing and analysing qualitative data in which weighting is used not only for coding but also for indicating the degree of importance of a data unit. In all cases, the authors point out that the use of quantitative calculations in qualitative studies should be used with caution, mainly to identify patterns and connections, and to organise and structure findings. At the same time, the researcher's work in examining the data in depth, interpreting it and searching for hidden patterns remains essential. In this study, the scoring approach is proposed by the researcher and is based on the intention to put more weight on the opinions of the experts and to sort the CSFs according to the number of mentions. The approach used is therefore appropriate, as it is only used to organise the data, and quantitative calculations are not used to interpret findings and address the ROs.

The resulting list of challenges obtained from the interviews, grouped by category and ordered by importance, are the findings of the interview, which are described in more

detail in Section 5.3.1. Obtaining a condensed list of challenges based on the interviews data is the first step towards achieving RO1.

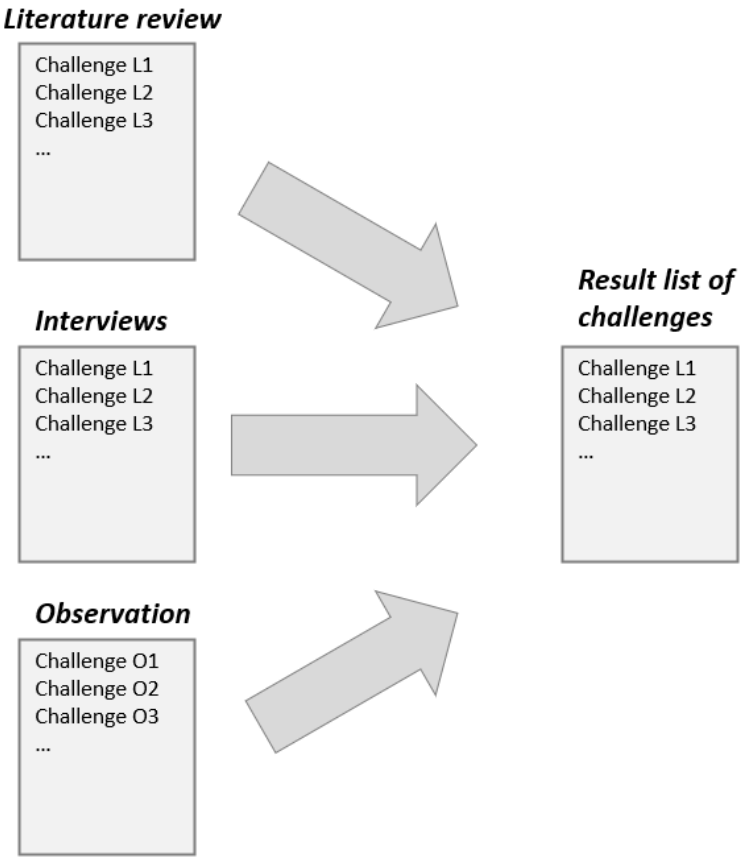


Figure 24. Data analysis using the principle of triangulation to identify challenges

Once the lists of challenges based on “Literature Review”, “Observation” and “Interviews” are brought to the same standard format, in which the list “Interviews” is presented (Table 4), they can be processed and combined. This process is depicted in Figure 24. The result of the union is the single most complete list, which is ordered in descending order of the updated Score (Table 6).

Table 6. List of challenges (schematic example): output format after combining interview, observation, and literature review findings

No.	Challenge	Category	Mentioned by	Score
1	Challenge 1	Technology	Interviewee 1 Interviewee 3 Interviewee 4 Interviewee 10 Observer Literature Review	16
2	Challenge 3	Organisation	Interviewee 2 Interviewee 4 Interviewee 7 Literature Review	10
3	Challenge 2	Technology	Interviewee 1 Interviewee 6 Observer Literature Review	9
4	Challenge 4	Organisation	Interviewee 2	5
...				
N	Challenge N	User Needs	Interviewee 3 Interviewee 10	3

When calculating the Score, the records from the observation are assigned a value of 2, which corresponds to the level of the Specialist. It is the level that correlates with the knowledge of the researcher, whose observations and personal interpretations are fairly assessed as the equivalent of an interview with one of the interviewed participants in the case study. The elements of the "Literature review" list is assigned a Score value of 3. This is an expert level. This choice is based on the very essence of the relevant literature review, during which the researcher has the most significant and frequently

encountered conclusions of leading IT integrators and authors who are experts in the field of chatbot implementation.

Chapter 6.2 presents the result of this two-stage data processing and the formation of the final list of challenges, which addresses RO1.

RO2: Critical success factors and strategic options for successful chatbot implementation.

To achieve the RO2, identical data processing procedures are used that for RO1, which are described in this section above. Findings obtained from three sources (Literature Review, Interviews, Observation) are brought to a single format of the conceptual framework. The data obtained in the second parts of the interview, in which the interviewees answered the question **"What are the critical success factors for successful chatbot implementation?"** are processed and compiled into a single list. These findings are presented in section 5.5.2. Next, this data is combined with the lists of success factors identified in the literature review and observation. This process of combining the three lists of CSFs obtained from the three sources is shown schematically in Figure 25. Each element from the combined list of critical success factors receives a Score value, the least important, secondary and little-mentioned factors are excluded. Thus, the final list of critical success factors is formed, which addresses RO2. The result of this analysis is presented in Chapter 6.3.

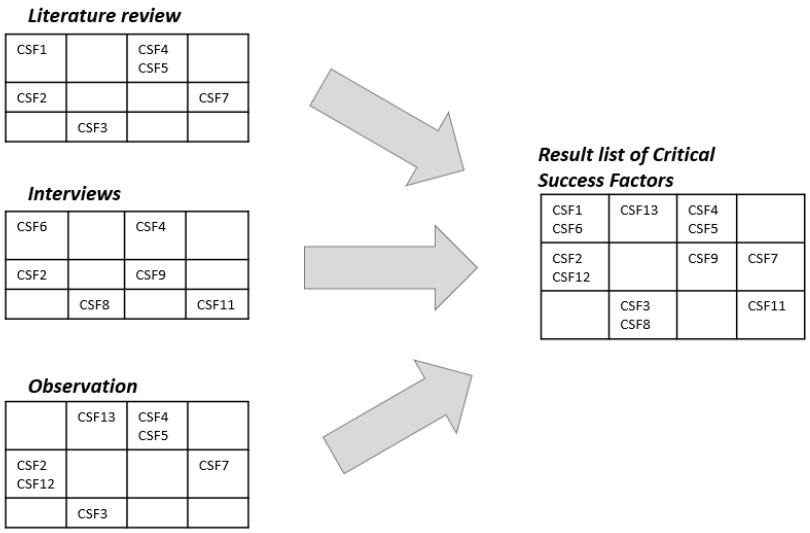


Figure 25. Data analysis using the principle of triangulation to identify CSFs

RO3: A new framework to support the chatbot implementation process.

To achieve the aim of the study - the development of a new model for the successful implementation of chatbots, the researcher uses the results used to address RO1 and RO2. Chapter 6 describes how, with the help of the responses received, the content of the conceptual model is updated and supplemented, bringing the researcher closer to achieving the RO3. The result obtained, presented in a visual form using the structure of the conceptual model, is a well-structured material for further analysis and interpretation. The researcher analyses the structure of the model, its content, reveals the links between the elements, finds new meanings, and discusses the degree of influence of the identified factors depending on the phase of the project. The result of this work is an updated model for the successful implementation of chatbots, presenting which the researcher achieves RO3.

4.8 Results validation and research quality

Validity and reliability are important criteria that are directly related to the quality of the study. Validity is related to the researcher's ability to demonstrate the accuracy of

the data and the fact that the data is indeed a form of the phenomenon under study. According to Guba et al. (1994), credibility is the only factor which indicates the internal validity in qualitative study. This is supported by Trochim et al. (2007), who argue that credibility is a synonym of validity in qualitative research, which is usually based on the study of personal experiences of participants, their feelings and beliefs. Trochim et al. (2007) assume that participants are the ones who can best review research findings and evaluate how much they match their opinion. The level of trust heavily depends on how correctly and accurately researchers reflect the opinion of the people who take part in a study. Participant validation is a technique that allows researchers to achieve credibility of research data by involving participants in the process of reviewing the result (Saunders et al., 2016). Following this recommendation, in this study, much attention is paid to the procedures for verifying the data obtained with the direct participation of the interviewees. Interviews were conducted remotely via videoconferencing using screen sharing functionality. During the conversation, the interviewer writes down the key thoughts and statements of an interviewee, and in case of doubt, asks them to clarify their thoughts. In addition, at the end of every interview session, the transcript is emailed to the interviewee for final review and corrections. Only after confirming that all opinions are recorded and formulated correctly, is the data used by the researcher for processing and analysis. Checking the correctness of the data obtained during the interviews, and discussing the result with participants, helps the researcher in a correct and less biased interpretation of the findings.

Reliability represents the integrity of the approach used in the study and the possibility to perform the experiment repeatedly and obtain identical study results. Kumar (2014) argues that in qualitative studies approaches to achieving a valid and reliable result are less obvious and complex comparing to quantitative studies. In this study, as in most other qualitative studies, the studied phenomenon is not static, and the procedures used are not amenable to full standardisation. Obviously, even a complete reproduction of the case described in this study, will generate the result of the study, which will

differ much or slightly from the original. The company that integrates the chatbot, and the environment in which the participants exist, are constantly changing; and the participants themselves are developing and may change their point of view on certain issues. Likewise, Guba et al. (1994) doubt the ability of the results of qualitative studies to be broadly generalized and transferred. However, they identify **dependability** and **confirmability** as two important criteria which measure research reliability. They argue that to some extent generalisation can be achieved by a careful and exhaustive description of all stages of a study (dependability). Description of the research methodology, justification of the chosen methods, a detailed description of the ESteelCo case study, and the process of collecting and analysing data are all integral parts of this research work. All these activities aim to establish the quality of the research, and to some extent create an opportunity for reproduction by others.

The second criterion, confirmability, is associated with the possibility that research findings and conclusions stated by a researcher can be confirmed by others. To check the accuracy and validity of the research findings, the researcher discussed them with five experts, two of whom were the interviewed participants, whilst the other three were not previously involved in the case study (Table 7). The selection criteria for respondents participating in the validation requires that their experience allows them to thoroughly analyse the content of the model, measure the completeness and validity of its elements, and also assess the model's applicability in practice through the prism of their extensive project management experience. The selected participants fully or partially meet the following criteria and are the most suitable experts for this role among those available to the researcher:

- Experience in IT management in positions such as CTO, director, or department head for at least 5 years in a large or medium-sized organization.
- Substantial experience in managing projects for the implementation of new Information Systems (IS).

- Experience in participating in R&D projects, projects for the implementation of AI, chatbots, or other IT projects with a high degree of uncertainty.
- Possession of a scientific degree or higher education qualification in the field of IT.

Table 7. List of the experts involved in the validation process.

No.	Was involved as an interviewee?	Characteristics
Respondent 1	Yes	Senior IT manager and department head in a large company. Responsible for managing a programme of new IS integration projects including CRM, e-commerce platforms, AI application and chatbots. Experienced methodologist who organised the production of IT projects in an international IT integrator. Participated in several chatbot implementation projects as project leader.
Respondent 2	No	Head of project implementation department in a large IT integrator. Leads the development of multiple projects including new CRM integration, website development and chatbot integration.
Respondent 3	No	Professor in Digital Skills with experience in AI, cyber security, and data science.
Respondent 4	Yes	Director of digital transformation in a large enterprise. Responsible for managing a programme of IT projects including ERP, CRM, websites and various AI application projects including chatbots. Previously involved in several chatbot implementation projects, either as project lead or key stakeholder. Holds a PhD.
Respondent 5	No	IT Director in a medium-sized company. Experienced in managing IS integration projects that include ERP, CRM, eCommerce platforms, AI applications and chatbots.

The discussion and validation process includes three steps:

- Step 1. The respondent is given a new model for the successful implementation of chatbot to study, this being the main output of the research. The material for review (Appendix 3) includes a schematic representation of the model, its description, and a questionnaire.
- Step 2. The researcher and the respondent discuss the results of the research. During this discussion, the latter has to find out whether the main goal of the study has been achieved by answering the question of whether the presented framework is a tool to add manageability to chatbot implementation projects, and whether the use of the framework may increase their chance of a successful launch. In addition to validating the result, the value of this dialogue for research is to identify weaknesses in the framework, limitations of use, as well as inaccuracies caused by existing limitations and possible researcher bias. This information was used to assess the prospects for applying the new framework in practice and determine the directions for further research on this topic.
- Step 3. The final stage of model validation is a short questionnaire which contains four questions about the model structure, assessment of the CSFs and Key Actions, the prospects of the model in terms of supporting teams in chatbot implementation projects and the ability to positively influence the success of projects. The participants give their assessment of the new model, and accompany their reply with a detailed commentary explaining their decision. The questionnaire is completed by the respondent without the presence of the researcher, which allows minimizing his influence. An example of one of the questions is shown in Figure 26, and a complete list of questions can be found in Appendix 3.

Question 4. Do you agree or disagree with the following statement: The new model for chatbot implementation can aid the manageability of chatbot projects and increases their chances of success.	
5	Strongly agree
4	Agree
3	Neutral
2	Disagree
1	Strongly disagree
Please explain your answer in 3-5 sentences	

Figure 26. New framework confirmation questionnaire form: question 4 example

Triangulation is a popular approach which helps to improve the validity and credibility of a study. Patton (1999) determines four types of triangulation, two of which are used in this study.

First, methods triangulation is associated with multi-method studies and use of two or more data collection techniques. Use of different independent data sources and application of various methods to analyse them and find the answer to the same research question help to verify and validate qualitative analysis (Patton, 1999; Saunders et al., 2016). The results of the interview, which allow addressing the ROs, are supplemented by observation. Using two different data collection techniques to achieve the same aim helps to examine the problem from different perspectives.

Second, triangulation of sources (Patton, 1999) or data triangulation (Guion, 2002) involves the use of different data sources within the same data collection technique. Two groups of participants are involved in the interview. The first group consists of participants in the project for the implementation of the chatbot in the ESteelCo company - these are members of the project team or stakeholders within the company.

The participation of a second group of interviewees, which consists of external experts and practitioners not involved in the ESteelCo project, allows the researcher to explore their beliefs and experiences gained in a different context. The difference in the scope, goals of implementing chatbots and the technologies used, makes it possible to identify characteristics that are inherent in various chatbot projects. The relative simplicity and efficiency of this type of triangulation allows identification of similar patterns in two types of data source, the presence of which confirms credibility of the findings.

When using observation as a technique for collecting primary data, the presence of an observer can influence participants being observed, thereby changing their behaviour and influencing the results. Such a presence may negatively affect the validity and reliability of the findings. The most preferred option, which allows minimizing the observer effect, is when the observer acts covertly, acting as a complete participant (participates in the process, personality is hidden) or a complete observer (does not participate in the process, personality is hidden). However, it is not always possible due to the ethical or organisational reasons (Saunders et al., 2016). The researcher in this study adopts the role of participant as an observer (participates in the process without hiding the objectives of the study) because hiding the fact of the study is inappropriate and impractical. Instead, the observer effect is minimized by the active participation of the researcher as an analyst in the project work. By making a tangible contribution to the result of the team's work, interacting with the team on a daily basis to solve the project's tasks, the researcher was perceived precisely as one of the members of the project team, without attaching importance to his participation in the research work.

4.9 Ethics

Once a study has been defined and a methodology has been chosen, researchers face an equally important issue related to obtaining the necessary access and ethical aspects. How will the primary data be accessed? Where and how will the research data be stored? How to comply with ethical standards and consider the rights and interests of research participants? All these questions are an integral part of business and

qualitative studies, which usually involves humans (Garner et al., 2013; Saunders et al., 2016). This study is conducted in accordance with the principles and procedures of the University of Gloucestershire (University of Gloucestershire, 2022). Many of these principles, which also listed by Garner et al. (2013) and Saunders et al. (2016), are widely accepted in academic field and are important rules that the researcher follows in his work:

Informed consent. Before the interview, each participant receives an interview invitation letter, which consists of two documents. First documents is an interview brief (Appendix 1), which contains a description of the prerequisites for the study and its aim, information about the research methodology, the interview script in the form of a tabular structure, information about the benefits of the study and possible risks, a description of the role of the interviewee, data about the research supervisors from the University of Gloucestershire and how to use research results will be used. Consent for participation in a research interview (Appendix 2) is the second document which is sent to interviewees for review and signing. The document lists the key conditions for the interview, basic information about the research, the right of the interviewee to refuse participation, information about the security and confidentiality of data obtained during the interview.

The right of withdrawal allows the interviewees to change his mind about the participation in the study, request their information to be deleted and not to be considered in the study. The interviewees are also agreed that their participation is voluntary and there is no explicit or implicit coercion whatsoever to participate.

Anonymity is the basic principle which enables the elimination of unnecessary risks related to any possible consequences for the participants, the impact on their reputation, career, or social presence. Although the interview script does not contain any sensitive questions, the researcher chose to maintain complete confidentiality of the participants. Providing specific names or personal details does not in any way

improve the quality of the research data but hiding them will eliminate the risk of any negative impact on participants, even if the likelihood of risk is negligible.

The accuracy and reliability of the data obtained in the study, as well as the correctness of secondary data, must be strictly observed. The researcher undertakes to strictly follow this principle and maintains objectivity, regardless of whether the results obtained correspond to the expectations of the researcher or his own opinion.

Depending on the form of involvement and the role of the researcher, there may be additional ethical issues that need to be explored and addressed. Walsham (2006) describes “outside researchers” and “involved researchers” as two possible styles that reflect their level of involvement in a studied process. He characterizes “outside researchers” as those who usually undertake their study through formal interviews with participants. This form of involvement allows one to stay neutral, reduce their influence on respondents, and minimize bias. However, the researcher considered himself to be an “involved researcher”, as he believed that valuable insights and original ideas, that help to solve the research problem, were more likely to surface in this closer form of collaboration. By joining the chatbot integration team as an analyst, the researcher gained in-depth access to the company data and employees. In this case, learning the organizational complexity and the context are going to be much easier in comparison to the possibilities of outside researchers. The close involvement style also has some negative effects. First, active participation in the project requires much time and significant effort to complete tasks that are not necessary for the research but relevant to the studied case. Second, being in close cooperation with the researcher, the interview respondents may be less open because they tend to generate opinions that the researcher expects to hear. Analysing these threats, the researcher must reflect on his role as an involved researcher, understand how they affect the observation process, research design, and reporting (Saunders et al., 2016).

4.10 Summary

The researcher made his philosophical choice, chose the methodology and designed his activities in relation to the research objectives which he aims to achieve during this exploratory study. The adopted interpretivism philosophy and selected inductive approach to the theory development enable the researcher to formulate the theory, which is based on a relatively small but meaningful sample of qualitative data. A case study strategy is used as the most applicable strategy for a researcher who is studying a real chatbot implementation project in a company. Direct participation in the project and contact with the team allows the use of semi-structural interviews and observation as data collection techniques.

The interview script, data collection and analysis procedures are heavily employed in the conceptual framework presented in Chapter 3. It becomes the basis on which the researcher relies when choosing data collection techniques and organizes the process of collecting research data for its subsequent analysis. The information obtained during the case study complements, clarifies and explains the results described in the Literature Review (Chapter 2). Together they represent a complete and coherent set of research data, which is further analysed, validated and used by the author to address the ROs. The use of the conceptual model as the essential template for organizing the data collected, as well as the use of three different sources (literature review, interviews and observation), increases the credibility and validity of research findings.

Finally, the new model for successful chatbot implementation is to be presented to industry experts and senior practitioners for validation. The review of the model, and discussion about the possibilities and prospects for its application in practice, help to strengthen the validity of the findings and make sure that the research aim is achieved.

5 Case study findings

5.1 Introduction

This section describes the main results that were obtained in this case study. Following this introduction, an outline profile of the case study is set out in section 5.2. The case study data is then collected, pre-processed, and organized into sections in accordance with RO1 and RO2. Section 5.3 presents the results of semi-structured interviews. Elements of the conceptual framework are used to organize data into an ordered structure. In section 5.4, the results of the observation are discussed, which are also structured using the conceptual framework. Both these sections are aimed at describing the results of the analysis of data obtained by two different methods and providing preliminary answers to the first two questions of the study. Finally, section 5.5 summarises the main issues arising from the chapter as a whole.

5.2 The ESteelCo case study profile

The chatbot implementation project was carried out in 2021 and 2022 at ESteelCo. This project formed the basis for the selected case study research strategy. The following information is background information which is provided to illustrate the context of the study, familiarization with which is necessary for a better understanding of the findings presented in the following sections 5.3 and 5.4, and conclusions drawn from them. These sub-sections follow on from the initial profile of the company provided in section 1.3.

5.2.1 New feedback management process

The chatbot under study resides within the ESteelCo order management and customer notification processes implemented in the CRM system. The existing ESteelCo notification process is depicted at the top of Figure 27. The order status information is being transmitted from the SAP ERP system to the order status database, and then to the company's website, where it becomes available to customers on their account page.

The new Enterprise Feedback Management (EFM) service (shown in the lower section of Figure 27) is based on the CRM system, which provides essential functionality and data for feedback management: stores orders and their statuses, customer profile updates, collection and processing of customer feedback, and provision of reports to the account managers and project team. The chatbot serves as a front-end system, which communicates with end-users in both directions. The bot can initiate a chat with customers by informing them of their order status changes (WhatsApp and Telegram are used as the most popular messengers in Russia). Customers are invited to provide their feedback or make a claim if appropriate. Their responses are being processed by the chatbot platform and transmitted to the CRM system in a structured format, where responsible managers can view them. In addition, the chatbot can provide an immediate response to frequently asked questions concerning stock availability, actual prices, production times, and others. Blended communication functionality enables account managers to resolve complex issues, process claims, or join the chat with users when the bot fails to answer.

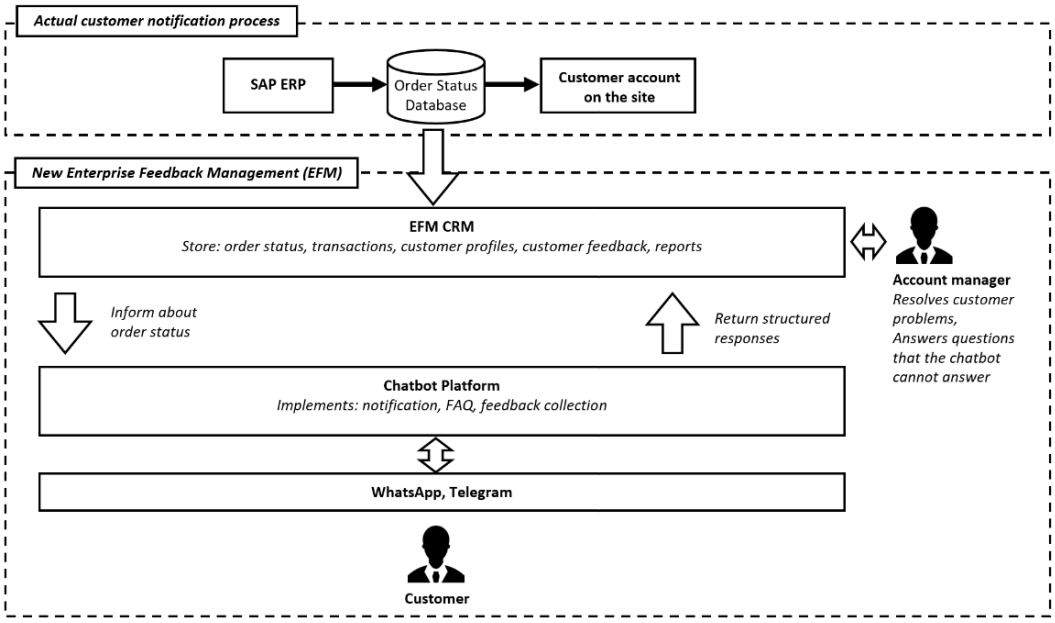


Figure 27. ESteelCo Enterprise Feedback Management process

The first version of the new EFM service offers customers the opportunity to get instant answers to the most common questions in Telegram messenger. The list of supported chatbot functions comprises:

- Client authorisation and authentication. Chatbot asks for user contact details to link their messenger account to the existing client's profile in the CRM system.
- Answer frequently asked questions (FAQs). The answers are retrieved from the company's knowledge database.
- Update orders details. The chatbot can accept a request to change order parameters such as delivery date, delivery address, recipient contact information, and others. Due to the variety of data and the complexity of the scenario, the chatbot only accepts requests for changes from the clients, which is then routed to the account manager for execution. Upon completion, the chatbot informs the client about the successful change.
- Get information about the status of an order, including the ability to subscribe to status change notifications.
- Receive client feedback. The client can share with the bot an opinion about the quality of the company's service. This feedback may be related to a specific order.
- Claims processing. A client can submit a claim by contacting the chatbot. As part of this scenario, the chatbot asks various details related to the problematic order. A description of the problem, photographs of documents, or photographs of the defect on the product are requested if the claim is related to the low quality or defect.

5.2.2 Project management approach

The project started in early 2021 with a preliminary conception phase, as depicted in the Figure 28. During this first phase, the EFM team evaluated the feasibility of using a chatbot to automate communication and collect feedback from customers. Next, they explored the local chatbot vendors and available platforms, chose the most suitable

solution and received an offer. The stage lasted almost four months, as it took the team a significant amount of time to analyse the solutions of various vendors, study the available examples of chatbot implementations. The task was complicated by the fact that the team did not have experience in implementing chatbots, and also combined work on the project with their main responsibilities in the company. The completion of the milestone 1 (M1) of the first phase was the approval of the project from the sponsor, the identification of the most suitable chatbot platform provider and integrator, and signing contract with the integrator.

The second phase - the definition phase - encompassed detailed analysis of existing systems, new process design, requirements definition for chatbot and CRM development, and dialogue scenarios creation. The result of the definition phase (M2) was a list of detailed requirements for the chatbot integrator, CRM integrator, and company's IT department. The company and the contractors also signed an additional agreement to their contracts, which included the detailed scope of work for implementation in the next phase, as well as the acceptance criteria.

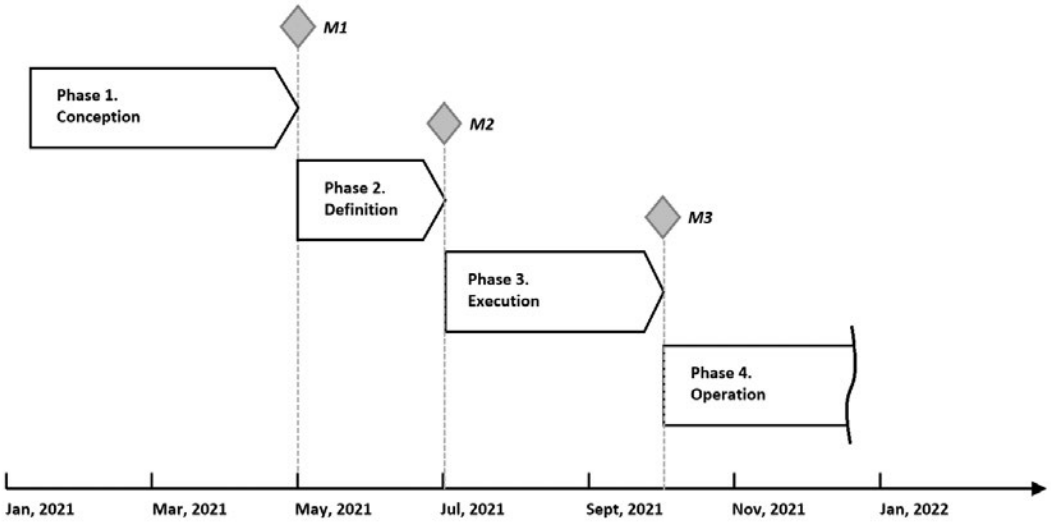


Figure 28. Project phase plan

The following phase three – the execution phase was of three months duration, and included implementation of the chatbot, CRM integration, testing, and systems deployment for customer use. The end of this phase (M3) was the launch of the first MVP, transition to productive operation and the beginning of the use of EFM services and the chatbot by the end users. Finally, the fourth phase began with user feedback collection and fine-tuning. Further development of the system in operation mode (Phase 4) was characterized by ongoing work to improve the service.

A hybrid model (a combination of agile and waterfall) was chosen as the project management methodology. On the one hand, a strict timeline, clearly defined project phases with a beginning and an end (Figure 28), and completion criteria for each phase, fixed budget and project scope are all elements of the waterfall approach. On the other hand, the desire to use an iterative approach to software development and the MVP method, the necessity to test the first prototypes of the chatbot in focus groups and adjust the project backlog accordingly explain the use of agile methodologies by the project team. Two teams worked in parallel on the project: the CRM implementation team and the chatbot platform implementation team. Starting with the Phase 3 Execution, each of the teams managed the development using an agile Scrum methodology. Two-week development cycles (sprints) of each team began with planning routine for the next iteration. The end of the sprint was the demonstration of the developed functionality to the project team and the planning of work for the next iteration. This use of the waterfall approach at the project level and the application of Scrum at the specific phases (3 and 4) was the most appropriate management model for this complex project. The waterfall provided the team with enterprise-level project planning tools, and Scrum significantly reduced the quality risks through a large number of iterations and the ability to verify the result of each iteration.

Project risks included the lack of chatbot expertise in the ESteelCo team, and the fact that there was no previous experience of launching similar services in the company. The technology and resource related risks were minimised by investing large amount of

time in finding an appropriate vendor with necessary competence, relevant background, and available human and technical resources. Readiness to reduce the scope, but not the quality, of the end product mitigated cost and time related risks. An iterative approach aimed at delivering a “Minimum Viable Product” (MVP) enabled the team to focus on the critical features and postpone responding to secondary change requests. Regular team communication and product feature demonstrations received valuable feedback from the steering committee, which highlighted important issues.

5.2.3 Chatbot capabilities

Using the MVP approach, the team determined the minimum but consistent functionality required for users after the launch of the first chatbot version. At the stage of transition from the concept (Phase 1) to analytics and definition (Phase 2), ESteelCo and the chatbot integrator company have signed a contract. This document included a list of functional requirements for the chatbot and its environment, which determined the following scope of work and constraints:

1. Virtual assistant supports two types of scenarios:
    a. Active scenarios - scenarios that activated by the user. He or she sends the first message to the chat, after which the dialogue is initialized and the bot replies.
    b. Passive scenarios or notifications are scenarios that are initiated by the virtual assistant. The chatbot sends the first message to the user in the chat, then the dialogue is initialized.
2. Dialog scripts can be linear or tree-like, contain one or more levels.
3. The scope of work includes no more than 16 dialogue scenarios with a maximum dialogue depth of no more than 20 levels (including messages from both the chatbot and the users).
4. The functionality includes scenarios such as Frequently Asked Questions (FAQs). Users can ask the assistant a question and receive one answer. A maximum of 100 FAQs are supported.

5. The implementation of assistant scenarios may include the use of machine learning models in the field of natural language processing, such as: typo correction, user intent classification, named entity recognition, sentiment detection.
6. If the virtual assistant fails to recognise the user's intention, it attempts to offer the user one if the predefined scenarios.
7. The virtual assistant can communicate with the external CRM system. It exchanges information both ways, by performing various actions on incoming requests from the CRM and by passing information to the CRM system for processing and storage.
8. WhatsApp Business and Telegram are two instant messengers which used for communication with users. The virtual assistant uses the functionality offered by these platforms. This means that the dialogue scenarios can be limited to the functionality of these two platforms.
9. The maximum load should be no more than 1 request per second.
10. Software operation mode is 24 hours, 7 days a week.

The chatbot platform includes a dialog editor which enables the following functionality:

1. Chatbot team can create new dialog scenarios, edit or delete existing ones.
2. There is no role model for dialog editor’s users. There is only one role - the administrator. Administrators can perform any action provided by the dialog editor.
3. Change the training sample for the machine learning models used for classifying user intents
4. Possibility to add no more than 1 image in .jpeg or .png format and no more than 2 megabytes in size to the text response of the bot.
5. The editor includes a widget that emulates a conversation with a user, allowing testing of dialogue scenarios before deploying them in a production environment.

The platform includes an analytics module which allows the chatbot team to monitor the following parameters:

1. Total number of FAQs and dialog scenarios
2. Number of dialog sessions per day/week/month
3. Number of unique users per day/week/month
4. Number of active users now
5. Dialogue depth for each dialogue scenario and dialog funnel report (percentage of users reaching each stage of the scenario).
6. Number of sessions by communication channel
7. User evaluation of the quality of the bot after each dialog session to measure the Goal Completion Rate and User Satisfaction.

A detailed description of the chatbot scenario that informs customers about their order status is provided in this sub-section. This sample scenario of medium complexity demonstrates the functionality and integration capabilities of the chatbot. The Figure 29 displays the "Order Status" scenario designed by the project analyst. Miro was used as a collaboration environment, which allows multiple team members to work on the same virtual whiteboard. Analysts or dialogue editors created new scenarios, other team members made changes or left comments, the project manager of the contractor's team checked the scenarios and, if necessary, suggested their improvement. Before writing scripts, the team specified the format and rules for describing them. Each scenario of the chatbot was represented using the flow diagram, which is often used by analysts to describe the behaviour of various IS. The standard chart elements have been extended with additional features that are relevant to chatbots and explained in the legend (Figure 30).

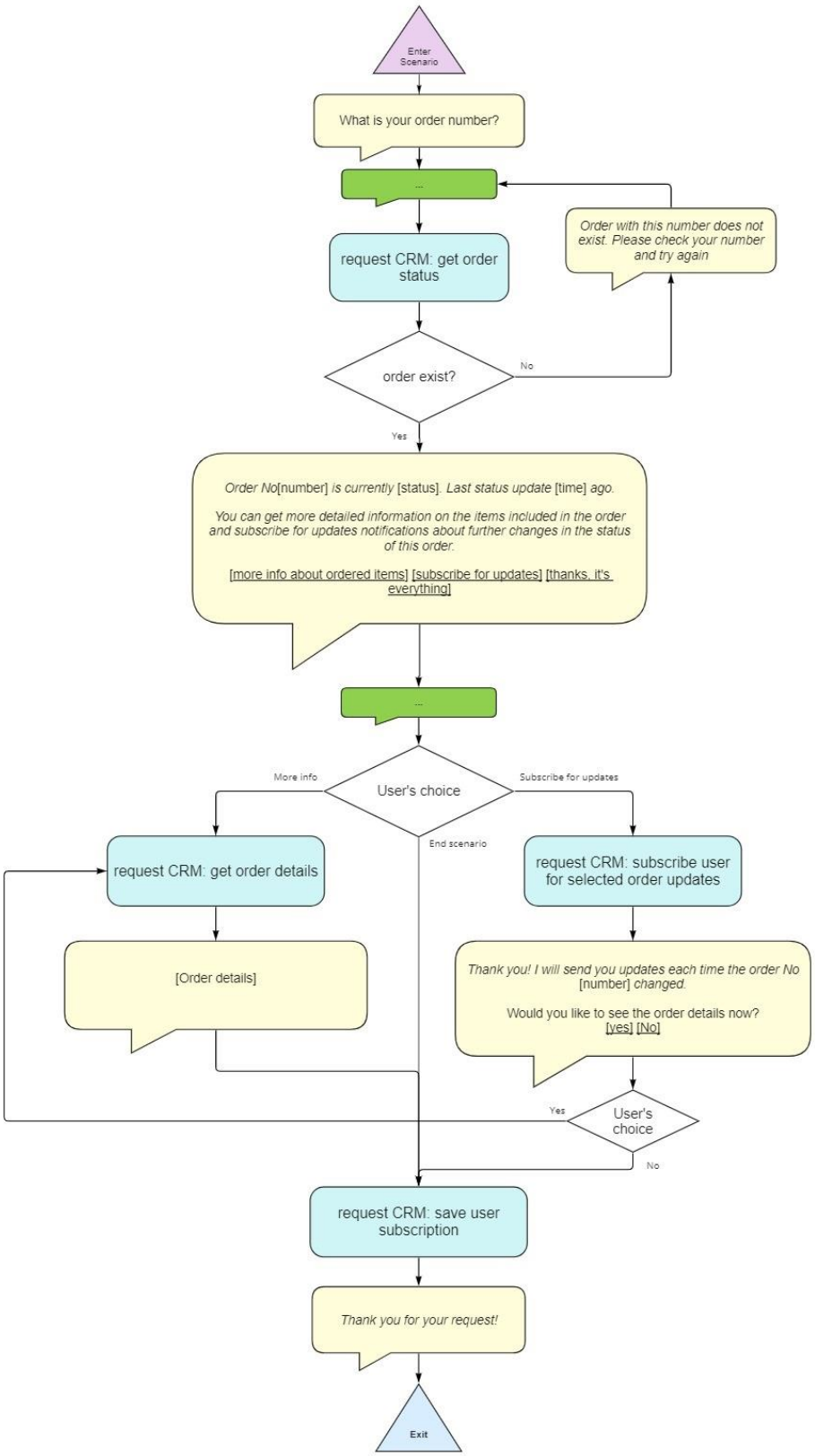


Figure 29. Order status scenario diagram

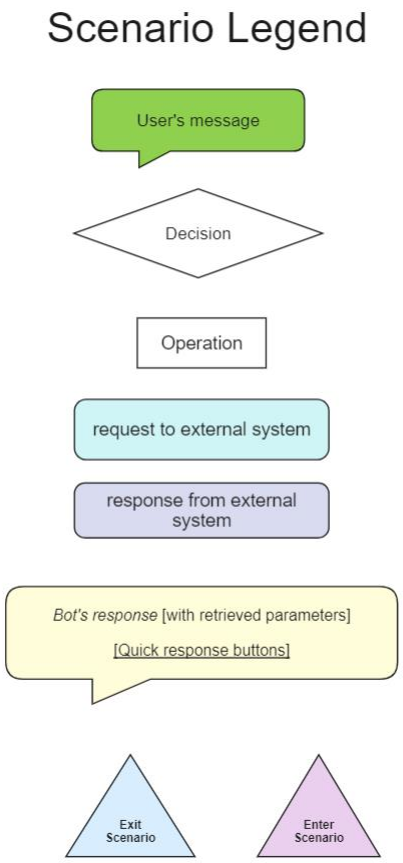


Figure 30. Chatbot scenario legend

In the initial state, when a user contacts the company in a messenger, the chatbot offers its help. It greets the user, briefly lists questions that it can answer, and invites the user to ask his or her question.

To initialize the "Order Status" scenario, the user should ask the appropriate question or express a request. This request can be almost any phrase that, in natural human language, corresponds to the desire to know the status of the order, for example:

- "I want to know the status of my order"
- "What is with my order?"
- "What is the status of my order?"

- "What is going on with my order now?"

The dialog module of the chatbot platform used in EFM project allows dialog editors to use the system of intents to process various user intentions. The intention is retrieved from the user's text query, formulated in natural human language, similar to the phrases listed above. The user can use an unlimited number of formulations of the same question, using an interrogative form, command, formal or informal communication style including typing misspelled words. For text processing, built-in NLP algorithms are used, which apply the probabilistic determination of intent from the request. The identified user intent can be linked with a relevant action. In the example above, if the intent is identified as "Order status", the system initializes the corresponding dialog script (Figure 29). The chatbot asks the user to enter an order number. The user can respond by providing a number or value that the bot can recognize as an order number, such as "No. 2345". Next, the script sends the "get order status" request to the CRM system. Along with the request, the order number and user ID are transmitted. If the order belongs to the client requesting the status, then CRM returns its detailed information. The chatbot responds to the user with a short message using the information received. In response, using the quick response buttons, the chatbot prompts the user to request more detailed information about the order, option to subscribe to status updates, or finish the current scenario by selecting "thanks, it is everything". If the user wants to know more information about the order, the chatbot retrieves the detailed information about the production of each item from the CRM system. This completes the script. If the user previously selected the option to subscribe for updates, then the chatbot activates subscription by sending a corresponding request to CRM. Next, the chatbot offers to get acquainted with more detailed information about the order or complete the current scenario. At the end of the script, the dialogue with the bot returns to the initial state, in which the bot offers its help, reminding the user of the list of supported topics.

5.2.4 Success metrics

There were two groups of metrics used to track the project results and the chatbot performance. “Net promoter score” (NPS) and “goal completion rate” (GCR) are the metrics which were used for measuring project success. First, NPS measures a customer’s loyalty to a company. It is a very popular metric, first introduced by Reichheld (2003), which has been used by many companies, including ESteelCo, to measure customer loyalty on an annual basis by asking one question “On a scale from 0 to 10, how likely is it that you would recommend this company to a colleague?”. Second, GCR measures the chatbot performance. In a chatbot context, it counts the number of chats when the bot was able to solve a user’s problem, without the help of a manager, divided by the total number of chats with the bot. Both NPS and GCR were used by the business team as success indicators which quantitatively show how well the chatbot solves its task, as well as how its development correlates with the improvement of these metrics.

In addition to the metrics that measure success, the business customer and development team used a group of secondary metrics. This is a set of parameters that reflect various aspects of the operation and development of the chatbot service, including technical and behavioural metrics. The most frequently used were:

- **Total number of users**. With additional dimensions such as users per day, week, month or new vs returning users this indicator this indicator reflects the activity of the users and the popularity of the chatbot among the company’s customers. This report is available in the Chatbot Reporting module.
- **Human handover rate**. It shows how frequently the chatbot fails to provide a correct response and needs human takeover. To measure this indicator, the CRM system reporting module is used. It counts the dialogs sent from the chatbot to account managers and compares it to the total number of dialog secessions.
- **Conversion funnel reports**. For conversational scenarios that consist of multiple sequential steps, the conversion funnel report depicts the percentage change in

users as they move from step to step. This report is available in the chatbot reporting module.

In addition to the above metrics, the administrator and development team monitored numerous technical parameters of the systems to ensure the stable operation of the service: chatbot response time, memory usage report, CPU Utilization report, DB usage reports, and others.

5.3 Interviews findings

5.3.1 Challenges

This sub-section lists the findings related to RO1 and provides the preliminary answers to the following question: **What are the main challenges which companies face when implementing chatbot projects?** According to the structure of the conceptual framework, all challenges are arranged into three categories: Technology related challenges, Organisation related challenges, and User needs and chatbot performance-related challenges. Interview transcripts are processed, the list of challenges mentioned by the interviewees is organized into a coded list, recurring ideas are grouped and brought to a unified formulation.

5.3.1.1 Technology related challenges

Challenge 1. Complexity and amount of system integration work. According to Interviewees 1, 3, 4, 5, 6, 8, 9, 10, 12, 13, 15**,** the amount of work on system integration and organization of exchange between chatbot IS and other internal IS of the company is often underestimated. In practice, the implementation of many chatbot scenarios requires programming to process chatbot requests to the internal IT services of the company to retrieve information required to answer a client's question. Interviewee 3 and Interviewee 4 argue that the program interfaces and data exchange formats are not standardized. Therefore, the integration represents a challenging task that takes time and increases project unpredictability. This point is supported by Interviewee 5 who

indicates the need to create ready-made interfaces for faster connection of a chatbot to popular IS.

Challenge 2. Difficult to find the best product and vendor which can solve your problem and will offer its service for a mid-term. Interviewee 1 draws attention to the fact that finding the right platform is a complex and not very clear process. Large and small chatbot software manufacturers offer their products. All of them have their own characteristics, strengths and weaknesses that should be carefully analysed for applicability to your project. Interviewee 6 supports this idea and draws attention to the fact that "chatbot is a new technology and therefore there are no companies in the market which offer a reliable integration service". Many companies are small new start-ups and their future is not predictable. Interviewee 15 adds that the platforms available on the market do not offer ready-made solutions, so significant adjustments are needed to create a chatbot according to the company needs. According to Interviewee 14, the term 'chatbot' is often used to describe a wide range of technologies and solutions that have little in common. They differ in how they work, in their complexity, they can be stand-alone systems, or they can be solutions with many integrations with other systems that solve individual problems well. All this complexity and diversity creates a high level of uncertainty for top management, IT leaders and business teams. It is difficult to answer the question of what kind of technology we need, what approach to take, and what the limitations are in each case. Thus, it is challenging to find not only the most suitable software but a reliable partner which can maintain and develop your service for many years after successful launch.

Challenge 3. Chatbots require significant calculation resources. Many companies are not ready to purchase the required hardware. Interviewees 2, 4, and 7 point to this problem, which is a consequence of the fact that projects with extensive use of machine learning are computationally demanding. Engaging an expert for server architecture planning will help to correctly estimate the required resources (Interviewee 2). In the budgeting

phase, teams should not underestimate the budget required for chatbot related hardware (Interviewee 7).

Challenge 4. Many people with little chatbot implementation experience mistakenly believe that an appropriate chatbot service can be created with little investment. As in Challenge 3, the lack of relevant experience in among the team and top managers may be the reason for an incorrect assessment of the complexity of a chatbot creation project. Interviewee 2 recommends contacting an expert, if the team lacks the necessary experience.

Challenge 5. Few companies are able to collect, analyse and use their internal data to improve their chatbot characteristics. Creation of a successful virtual assistant is not limited to the implementation and integration of the necessary software modules. For a bot to be able to determine users' intentions with a high probability and find the correct answer, it is necessary to use various data sources to train the bot. For most companies that have not previously solved this problem, it is not so easy to find suitable specialists in-house. Timely planning of this type of work, training and development of the necessary competencies within the company is necessary (Interviewee 11). Call centre data, such as recorded phone calls, webchat history may be the most appropriate data sources to start with (Interviewee 7).

Challenge 6. The complexity of solving regulation and information security tasks is often underestimated. Interviewees 2 and 10 mentioned their difficulties in coordinating the launch of their chatbots with the information security departments. Chatbots are complex projects in terms of system architecture, which often have access to various important company data sources, including users' personal data. Assessing all possible risks and developing preventive measures can require a significant amount of time, so this work should be planned at an early stage (Interviewees 3, 12).

Challenge 7. Overall complexity of chatbot projects and necessity to deal with many software systems and IT technologies. Conducting an interview with the potential vendor and in-depth study of their experiences may help to identify the potential

project risks at the very beginning (Interviewee 4). Implementation should start only after a thorough preparation of the concept and analysis (Interviewee 8).

Challenge 8. Companies usually lack the necessary specialists in house. The availability of IT professionals is a serious barrier for most companies planning to implement solutions that use new technologies. Despite all the difficulties, Interviewee 11 recommends looking for opportunities to gradually create and develop the team in-house. This will improve the quality of the result, reduce the cost, and reduce the risks of dependence on service providers in the long term.

Challenge 9. Current chatbot technologies are complex but not yet perfect and bots often fail to process users' requests properly. Thus, creating chatbots is a challenge, and a perfect result is not guaranteed even with the best technology is used and the participation of a strong team is in evidence (Interviewee 7).

Challenge 10. The license and support costs of a chatbot systems from leading vendors is too high for companies, what forces many of them to create their own solution. In the long term, companies for which a chatbot is an important part of their service, benefit from the creation and development of their own solution (Interviewee 11).

Challenge 11. The large number of technologies used and the diversity of the external IT landscape depending on the region are hindering the rapid adoption of chatbot technology. Each country has its own unique landscape of online services (social networks, instant messengers), which determines the opportunities for local users and unique constraints in the development of each market. This slows down the development of chatbot technology in general (Interviewee 14).

5.3.1.2 Organisation related challenges

Challenge 1. Top managers often underestimate chatbot integration project complexity and costs, and are not ready to invest significant budget in a new technology adoption. Businesses often don't understand why they should invest in a chatbot, or how much investment in this technology makes sense (Interviewee 14). This is the result of a small

number of success stories which are publicly available (Interviewee 6) and the lack of individual experience of top managers involved. The availability of cheap and relatively primitive chatbot services from vendors that promise a fast launch of a quality solution gives many managers the false impression that chatbots should be cheap (Interviewee 1), which leads to underfunding of the projects (Interviewee 7). Nevertheless, interviewees 1, 4, 6, 8 argue that demonstration of success stories of other companies and a more detailed acquaintance with the characteristics of their projects can help form the right idea for top management about the complexity of the task ahead and the real possibilities of chatbot technology.

Challenge 2. Low quality of implementation services provided by vendors and IT integrators. Interviewees 1, 3, 4 note the general immaturity of market participants providing services for the implementation of chatbots, which mainly seek to formally complete the project, and not solve the company's business problem. Interviewee 2 adds that the situation is aggravated by distrust between contractors and customer companies, which leads to excessive bureaucracy of their partnership. Finding the right project leader who will formulate product requirements and order service from a vendor should make the process manageable. It should not be a top manager who has no relevant skills and enough time to invest in the project (Interviewee 1, 6). Interviewees 1, 10 recommend finding a chatbot expert inside the company or an external one. He or she should be someone not from the vendor or IT integrator team to offer the business team an independent view and constructive criticism. Interviewees 3 and 4 advise being more careful in choosing a service provider. Interviewee 2 also draws attention to the fact that customer companies could trust the expertise of vendors more and involve them more in drafting project requirements.

Challenge 3. Planning and managing chatbot projects is challenging due to their unpredictability and high uncertainty. Many companies use traditional waterfall or hybrid IT project management methods when implementing chatbots, where a high degree of formalization, detailed planning, and an accurate description of the result are

important. Interviewees 2, 7 argue that a product approach, use of iterative development and the MVP method will allow teams to manage the project in conditions of high unpredictability. However, Interviewee 2 claims the opposite - “use of agile methodologies makes the project vague. Sometimes it is not clear at what stage we are, which important tasks we missed“. Interviewee 2 recommends: “use product management instead of a project management approach. This means – do not think that your project has a well-defined start and end. Plan continuous development and improvement and approach your vendor selection accordingly”. Various management methods such as W.I.N (What Is Important Now?) (Interviewee 3) or online collaborative software like Miro, Google Docs, and Trello (Interviewee 4) can provide some assistance. Regular frequent communications within the team and with the vendor will improve the manageability of the project (Interviewee 4).

Challenge 4. Difficulty in formulating project objectives, success criteria and measuring KPIs. Interviewee 8 explains that “companies often do not understand their strategic goal related to a chatbot implementation; they cannot answer exactly why they need a chatbot. This leads to weak concept formulation, incorrect problem definition, and as a result, incorrect choice of the selected tools, vendors and services, budget planning and timing”. This is supported by other interviewees (2, 3, 4, 6, 7, 12, 13, 14) who note that the lack of necessary experience leads to difficulties in formulating project goals, and in defining success criteria and metrics that measure the effectiveness of the chatbot. Thus, companies should pay more attention to goal setting (Interviewee 4), determine the role of the chatbot in the communication strategy (Interviewee 8), and use CRM data to track various productivity metrics: average response time, time to solve user’s problem and others. Comparison of human productivity vs bot productivity (Interviewee 3, Interviewee 6) may demonstrate the real chatbot efficiency. Interviewee 11 adds that in order to assess the effectiveness of the chatbot and its profitability, companies can use the cost-per-contact with a client, and the cost of training a new operator.

Challenge 5. Lack of in-house chatbot expertise and limited availability of relevant specialists in the market. Interviewees note that they face a lack of necessary expertise and experience even in large companies and finding and hiring specialists in the market can take a significant amount of time. Interviewees 4 and 10 recommend hiring new employees with the necessary skills and experience to facilitate project progress. On the contrary, Interviewees 5 and 9 support the idea of involving the existing team in the project and training them. Project leaders should evaluate how existing staff can manage and maintain the bot (answering live chat, checking and improving performance, updating content), and turn this work into their daily routine (if no extra staff are hired). Interviewee 13 claims that companies lack the experts who can create a holistic strategic approach to implementing chatbots in various parts of the business.

5.3.1.3 User needs and chatbot performance related challenges

Challenge 1. User scepticism about the capabilities of chatbots and unwillingness to interact with them. This is the most significant challenge noted by almost all interviewees. It is largely due to the still imperfect technology, the large number of low-quality chatbot services available on the market, and also because of the negative experience of users in the past. In addition, Interviewee 3 argues that "humans like to talk to humans, so many users avoid chatting with a bot", believing that despite the impressive achievements of modern technology, many users have an internal reluctance to communicate with a robot and resistance to change. However, the interviewees offer a number of solutions that can significantly improve the user experience and partially overcome the existing scepticism:

- Teach your users how to use your chatbot (Interviewee 1) and advertise bot functions and advantages for users (Interviewee 3, 4). Bot features should be promoted not by its developers but by the marketing team or end users (Interviewee 3). Prepare high-quality presentation materials explaining the benefits of the chatbot, involve account managers to popularize the bot (Interviewee 9).

- Design an excellent user experience and create a chatbot as a quick and convenient service for users, which helps them to find information they need (Interviewee 1, 4).
- It is necessary to provide alternative ways to solve user problems (phone, website) so that communication with the bot is optional and happens only when a client wants it (Interviewee 3, 4, 5).
- Use blended communication of a bot and operator. Redirect the request to operators when your bot is unable to process client requests (Interviewee 11).
- Allocate enough budget for the creation of a high quality chatbot (Interviewee 5) and involve a user experience (UX) designer who will help to focus on the user needs (Interviewee 7)

Challenge 2. Difficulty in creating a chatbot which solves the company's problem and provides users with an excellent service at the same time. Interviewees 1 and 10 mention the risk of a conflict of interests between business and users. By pursuing performance optimization and operational cost reduction, bot creators do not pay enough attention to user needs. As a result, customers do not use an inconvenient service, and the goals planned by the business are not achieved. In order to succeed, it is important to create an additional value for users and design an excellent user experience. Chatbot must become a quick and convenient service for users.

Challenge 3. The scenario-based approach for creating bots prevails but limits their capabilities. Complex behaviour based on ML algorithms often leads to unexpected and unpredictable results. Therefore, in order to achieve full control over a chatbot's behaviour, their creators use strict tree-like algorithms (Interviewee 2). Interviewee 11 adds that "in practice, button interfaces are simpler and more understandable for users than the option to enter any request, formulated in human language." They recommend using a button input option where appropriate and offer a free text input when various requests from users are expected. Interviewee 2 also notes that the creation of a

flexible and convenient chatbot service is possible as a result of a large number of experiments for which the team must be ready.

Challenge 4. Insufficient data used by ML algorithms leads to unsatisfactory bot behaviour. Generic ML models are not always ideal for creating new business solutions. In order for the bot to be able to handle domain specific user requests, additional training of language models is usually required. Companies should collect as much data as possible to train models so that the chatbot can more accurately answer user questions. This should be part of a strategic collaboration with the vendor (Interviewee 2).

Challenge 5. User behaviour in chats is very different from other channels (phone, website, mobile app). High-quality UX design skills and user training are required. Chatbots are still a relatively new way of interaction for users as well as for their creators. The techniques and methods that IT professionals and designers have been successfully using for years to create websites or mobile applications are not always applicable to creating chatbots. Dialogue may not always be the best product interface (Interviewee 14). “Jobs to be Done” method may help to study user needs and design appropriate bot behaviour (Interviewee 8). Interviewee 9 suggests using CJM to study and describe the path of user interaction with company services. Both Interviewees 8 and 9 argue that collaboration with users is very important at all stages of creating a chatbot. Surveys and in-depth interviews help to validate the quality of bot functionality and identify customer needs to prioritize development of new features. Interviewee 11 states that “chatbots are much more effective if they are built into the interface of your company's mobile application. By using the useful functions of the application and prompting users where to find the information they need, such bots can solve more user problems than bots that chat with customers in external messengers like WhatsApp”. In addition, a special training on the use of a chatbot can be helpful for users (Interviewee 14).

5.3.2 Critical success factors

5.3.2.1 Conception phase

Technology related success factors.

Explore vendor options and external service availability in your field and locality. Interviewees 1, 2, 3, 4, 6, 7, 11, 12, 13 note the importance of studying in detail the key players who provide their solutions for creating chatbots in your field. Creating a chatbot is not limited to installing only a single platform. For example, if users are going to communicate with a virtual assistant via instant messengers, it is necessary to study the capabilities and limitations of popular instant messengers in the region.

Identify and choose the most suitable technology and vendor which meet your business requirements. Already at the project definition stage, it is important to formulate the key requirements for the platform, which predetermine further steps like choosing a vendor and project planning. Interviewee 11 points out the importance of a wide range of platform and editor features that should allow the team to develop the chatbot on their own. Interviewee 2 argues that depending on the company size and aim, chatbot teams choose between SaaS and on-premises solutions. Interviewee 6 recommends that "companies choose a software product from a strong vendor which will operate in the market for a long time developing its product". Knowing the features of vendors and the key characteristics of their products, will allow for an objective comparison when the requirements are ready. Special attention should be paid to studying their cases of real implementations of chatbots for your competitors or companies whose business profile is similar to yours. Interviewee 7 suggests that "it should be considered to hire several contractors, each of which implements the part of the bot in which they are the best in the market".

Analyse build and buy approaches to define your strategy. Most interviewees (2, 3, 4, 7, 8, 9) argue that companies should be aware as regards answering this question. If a chatbot is something new for a company, or it does not have the necessary

competencies, then the approach of acquiring and integrating a third-party service is most justified. Own development may be appropriate if the chatbot is an important component of a large business, the amount and frequency of changes are high, and the company's management is confident that they can find the necessary specialists, and retain and develop them within the company.

Choose a platform that can provide detailed reports about your chatbot performance. Most of the interviewees consider the reporting functionality to be one of the most important elements of a chatbot platform. Without reporting that allows them to track the quality of the bot, it is impossible to use a product approach and evaluate target metrics. According to the Interviewee 8 a chatbot "platform should offer the following types of reports: 1. technical characteristics and performance indicators of the running chatbot software, 2. behavioural characteristics and scenario funnel reports. 3. Reports about requests were not processed properly".

Analyse API of the selected platform and how to integrate it with the company's IS. By providing a service to a client and answering questions, chatbots will use data and information stored in the company IS (CRM, ERP, Knowledge database, and others). Thus, according to Interviewee 2, chatbot system architecture should be planned with the perspective of the integration with company IS. Interviewee 5 adds that an important factor when choosing a platform is the availability of ready-made connectors and APIs for integration with the IT systems used in the company.

Study project portfolio of vendor candidates, request recommendations from their clients. When reflecting upon all the difficulties that respondents faced when choosing a vendor, many of them found it difficult to draw conclusions about the strengths and weaknesses of each solution. Each vendor claims to have the best product, but which one is really the best fit for your application? Interviewees 3, 4, 5, 10 recommend carefully studying existing projects that use solutions from vendor candidates. More attention should be paid to implementations in companies whose business or chatbot automation task is most similar to yours. Carefully study how their chatbot operates.

Recommendations from the vendor clients can be even more important. Chatbot teams should find a way to get to know other customer companies better in order to learn from their experience.

Involve your IT and formulate comprehensive technical requirements for the chatbot platform. Involving IT in the requirements definition process at an early stage will not only allow consideration of the needs of the business team, but also consider the technical limitations and IT standards adopted by the company. Interviewee 6 highlighted the need to "check how the chatbot software fits the company's IT strategy and IT landscape".

Ensure that the selected platform offers powerful testing tools. The testing and debugging tools are vital (Interviewee 1) at the execution stage, as well as in the process of continuous improvement of the service during operation.

Ensure that the selected platform has a powerful dialog editor. According to Interviewees 12 and 13 such an editor enables rapid prototyping, faster deployment of the first MVP, and simplifies further chatbot support and development.

Organization related success factors.

Convince the major stakeholders that chatbot is worth investing in. According to Interviewee 1, it is necessary to receive the support of top management and the project sponsor. If they turn from sceptics into believers in the new technology at the very beginning, the project will receive the necessary support and the chances of success will greatly increase.

Identify use cases and assess suitability of using a conversational UI. Even though chatbot technology is becoming more advanced every day, and chatbots are increasingly used in business, they are not suitable for every task. Studying the best practices in your industry will help you to decide whether a conversational interface will be convenient for the customers.

Identify your aim, key success indicators and associated improvement metrics. Most interviewees (2, 4, 5, 6, 7, 9, 11, 14) point to the need to formulate business goals, success criteria, and define key metrics that measure the quality of the chatbot at the concept stage. Their absence leads to a loss of focus, unclear goals, and a misunderstanding of the purpose of the bot. Having solid experience in call centre automation, Interviewee 11 uses resolution rate as a universal metric which measures efficiency of both human and virtual assistants. By comparing the performance of a human and a bot that replaces a human, the company can determine how efficiently the bot performs its task of automating routine work.

Prepare the ground for agile working. Interviewee 5 argues that "trial and error mentality" is essential for creating chatbots, and teams should treat chatbot projects as an experiment (Interviewee 7), because projects, which use machine learning, are not fully predictable. Most of the interviewees argue that the use of agile methodologies is necessary for a successful outcome. At the same time, interviewees 2, 5, 7, 9 indicate the need to provide appropriate conditions for agile methodology adoption at the conception phase. Interviewee 2 adds that it is important to overcome legal obstacles that prevent use of agile. It is not reasonable to describe the entire scope of work in advance and get an accurate estimate. Instead, doing short iterations and paying the contractor by time and materials may help to achieve the required flexibility.

Find a reliable chatbot integrator. Focus on the service provider selection process and find a reliable partner which will offer its service for many years (Interviewee 6).

Find a chatbot expert to join your team. If the chatbot project team does not have a leader with extensive experience and deep knowledge of the chatbot area, then such an expert should be involved as a consultant (Interviewee 7, 8, 14). Interviewee 1 recommends "finding a chatbot expert inside your company or an external one. He or she should be someone not from the vendor or IT integrator team to offer you an independent view and criticisms". Interviewee 8 adds that at the concept stage, the

expert's help will be indispensable in choosing the platform and service provider, as well as in formulating the project goal and defining success metrics.

User needs and related chatbot performance success factors.

Limit your project scope. A few well-designed features are better than broader functionality of low quality design. Limitation of the amount of functionality at the start of the project and a focus on the most important aspects (Interviewee 1, 5, 9) are elements of the MVP method, which is also recommended by the interviewees. Interviewee 9 explains that "it is necessary to limit the scope of the functionality to be developed. However, you should not be limited to one function. Having a well-implemented core scenario and a set of additional scenarios may be the most optimal approach."

Analyse alternatives to the chatbot service. Specify why the chatbot is the best way to solve your problem. The use of a chatbot in a situation where the dialogue interface is the most relevant predetermines success (Interviewee 1, 3, 5, 7, 9, 15). A chatbot should create additional value for a user, greater than the website, mobile application or other company services (Interviewee 5). Interviewee 7 adds that the chatbot should solve the user's problem better that any other option like a website, an app or a call center.

Focus on one business objective. Trying to solve many different and unrelated tasks with a single bot can lead to the team not paying enough attention to the main aim of the bot. Once it is determined, the team's actions should be directed towards achieving the goal. Not developing unnecessary functions will allow available resources to be used for obtaining a high-quality result and meet one initially formulated objective (Interviewees 2, 3, 6, 7, 13, 15).

Use a product approach and tools to study user needs. Interviewee 1 argues that the identification of user requirements should take place with their involvement, for example, by using interviews or surveys. The teams should also apply techniques such as jobs-to-be-done (Interviewee 8) and CJM (Interviewee 2, 7, 8, 9, 13, 15) to explore the

user needs, plan the feature development in accordance with the identified needs, and evaluate the result using selected metrics rather than follow a formal project plan – all these are elements of the recommended product management approach.

The chatbot must be not only good for the company but designed to make the customer's life better. Interviewees 6 and 10 indicate that in an effort to automate routine operations using a chatbot, there is a risk of forgetting about the real needs of the users. Only a service whose creators want to help users solve their problem will be successful.

5.3.2.2 Definition phase

Technology related success factors.

Define scalability requirements and realistically estimate the required hardware. Chatbots, like many other projects using machine learning algorithms, are demanding on computing resources. The number of servers and the requirements for their characteristics depend on the technology used and the specific task. By calculating the required hardware resources in advance, the project team can plan the necessary budget and prepare the servers before launching the service in production (Interviewees 1, 4, 14, 15). Interviewees 6 and 7 also recommend involving an expert in this process if none of the team members have relevant experience.

Strategically plan the compatibility of the bot platform with the company's internal IT systems. A chatbot should not just be developed and launched. If successful, a whole set of technologies and software modules will become part of the company's IT environment. Interviewee 2 recommends planning strategic development with the participation of the vendor in order to answer questions about how and who will support, develop, and update the chatbot software and related IS.

Invest in analysis and planning of system integration and data migration tasks. Many of the interviewees (Interviewees 1, 2, 3, 4, 7, 8, 11, 12, 13, 15) shared their negative experiences related to insufficient assessment of the complexity and scope of work to

integrate the chatbot with the company's internal IS. In most cases, to find answers to users' questions, a chatbot searches information in various company IS. The implementation of many bot scenarios depends on the successful integration with the relevant data sources. Timely planning of this integration work and allocation of the necessary budget significantly affects the success of the project. System analysis and determining the place of the chatbot in the information architecture of the company allows the team to correctly assess the upcoming work. Analysis of the data flows helps in evaluation of the work on integration between systems and data migration.

Obtain necessary access to IS and solve information security issues. In large companies, obtaining the necessary access to IS and passing information security procedures can take a significant amount of time. Solving these issues at the definition phase helps the team to avoid delaying the start of development and the launch of the chatbot (Interviewees 4, 8, 10, 12, 13).

Estimate and plan the required amount of hardware for the bot to work. Chatbots use ML algorithms to solve NLP tasks, which typically require a lot of hardware. Interviewee 6 recommends consulting an expert to calculate the exact amount of resources needed and purchase servers well before the chatbot is set to go live.

Develop a quick prototype to test the selected platform. Creating a rapid prototype using available company data (such as call centre recordings) on a chosen platform will allow you to explore its capabilities and limitations at an early stage (Interviewee 14).

Formulate comprehensive functional requirements that determine the result. The business team should formulate functional requirements that define the result and capabilities of the future service. The more specific and exhaustive the description, the better (Interviewees 14, 15).

Organization related success factors.

Form a product team on the customer side which includes a product owner, analyst or dialog designer, UX-designer, data scientist, technical leader. At the definition phase, it

is necessary to form a team that will be ready to implement the chatbot (Interviewees 2, 3, 4, 7, 8, 10). The product owner in agile teams is mainly responsible for managing the backlog and prioritizing new feature development in order to achieve the target success indicators. The analyst or dialog designer designs, describes and tests chatbot scenarios. The UX-designer is a specialist who studies the users' needs and, together with the rest of the team, creates a user experience that most closely matches these needs. The data analyst usually has experience in applying machine learning to word processing problems. His or her main tasks in the project are: collecting and preparing data for training language models, setting up and connecting the models, verifying the result, developing the dialog module and retraining the models. The technical lead can be a software development lead, an architect, or a senior developer who is the strongest technical expert on your team. This specialist should have extensive knowledge in IT, software development, DevOps and solving problems of data exchange between systems.

Communicate effectively your aim to your team, contractors, and top management. Explicit definition and discussion of the aim with all involved parties will help them to focus on achieving the aim when preparing the requirements for the bot and developing scenarios (Interviewee 3). Regular meetings with cross-functional members and divisions are necessary for project control and informing the stakeholders of important changes (Interviewee 4).

Draw up a detailed project plan and assign responsibility for key tasks. Despite the suggestion to use agile methodologies, Interviewees 4 and 6 recommend drawing up a detailed project plan, which includes a list of project milestones, and a description of the key tasks and responsible persons.

Use the MVP method and an iterative approach. According to Interviewees 5, 9, 10, 12, 13, 15 teams should use agile methodologies and sprints to divide up the workload and be able to adapt to change. At the same time, the target product requirements should be generally formulated (Interviewee 10).

Find a responsible project leader from the business team who has the necessary expertise. Interviewee 6 argues that "Chatbot projects should be led by business teams but not the IT department". Interviewee 1 adds that this project leader should "not be a top manager who has no relevant skills and enough time to invest in the project". Thus, it is recommended that a strong project leader is found from the business team with relevant project management skills (Interviewee 1, 6, 12, 14).

Pay attention to risk planning and management. At the definition phase, the potential risks should be identified, assessed, and an appropriate risk budget allocated (Interviewees 4, 9).

Coordinate project documentation with internal departments at this early stage of the project. Since a chatbot implementation project can affect the business processes of several departments, and the implemented software requires integration with various company IS, discussion and approval of project documentation with all interested parties is necessary to improve the planning process (Interviewee 9).

Ensure that the project knowledge is shared inside the team and not owned by one person. Interviewee 6 warns about the risk of losing knowledge if the only specialist in the company knows how the systems work. To mitigate this risk, it is necessary to invest the resource of the team in the organization and storage of the project documentation and knowledge management.

Ensure your IT department is ready for the implementation phase. The preparation may include installing the necessary hardware and software, granting access to IS, and setting up the development and production environments (Interviewee 1).

Form a single team with your contractor(s). Interviewee 2 argues that collaborative working of the contractor and the customer specialists can increase productivity and improve the quality of the result. Planning meetings with all specialists, a single project chat, one project documentation system - all this allows the teams of the contractor and the customer to organize the joint workspace.

User needs and related chatbot performance success factors.

Develop simple and intuitive UX. "Simplicity and linearity in the behaviour of the bot are important. Extra unnecessary features mislead the user" says Interviewee 9. Interviewee 11 adds that dialog designers should avoid complex three structured scenarios. "A user should not get stuck in endless script loops". The Interviewees 1 and 2 support the idea of creating simple chatbots that are intuitive to users.

Design a chatbot personality which fits your brand communication style. According to Interviewees 2, 3, 7, 11, determining the persona and communication style is an important step in a chatbot development process which makes the chatbot more attractive to users and improves the user experience.

Focus on chatbot productivity. The ease, speed, and convenience of using chatbots are vital. Interviewee 9 describes the ideal chatbot as a simple, intuitive service which easily solves user problems. The success of a chatbot directly depends on how well it understands user requests and how quickly and accurately it can provide responses (Interviewee 2, 3, 4, 6, 7, 8, 9).

Make sure the chatbot is the most convenient way for users to solve their problems. Usually, a chatbot is created as a new additional service that provides a more convenient and faster way to solve a user's problem compared with an existing website, mobile application or call centre. Thus, the success of the chatbot depends on how many users decide to use it instead of the alternatives (Interviewees 4, 9, 7).

Use CJM to determine the user journey and specify chatbot requirements. Customer journey mapping (CJM) is a handy tool to visualise the path of user interaction with the company from the very first touch to the end of the service. This approach allows teams to define the role of the chatbot in overall company communication and create useful scenarios that complement existing company communication tools (Interviewees 7, 8).

Plan methods and tools for collecting user feedback. Interviewee 11 argues that "the platform should allow measuring customer satisfaction at the end of each dialogue

session". At the definition phase, it is necessary to understand at what point the user feedback will be collected and what tools should be implemented for that purpose (Interviewee 8, 11).

Apply blended communication approach. Interviewees 11 and 12 argue that using mixed bot/operator communication is essential. Requests can be redirected to human operators in case the bot is not able to handle the requests of the clients.

5.3.2.3 Execution phase

Technology related success factors.

Consider the platform limitations when designing your bot behaviour. The functionality of the platform determines the possibilities for the team to create their chatbot (Interviewee 4).

Use SLAs (service level agreements) to set performance requirements for involved IS. The speed of the chatbot and its stability are directly related to the performance parameter, which is one of the key success factors named in the previous section 5.2.2.3. An SLA is effective for defining formal requirements and standards for the quality and speed of the company IS and associated interfaces, the performance of which affects the performance of the chatbot (Interviewees 7, 12).

Perform load testing, and plan and prepare infrastructure for a high load. Chatbots are demanding on hardware, so there is a high probability that the system will slow down or be partially unavailable under a heavy load. Load testing, which emulates the real planned load, allows you to identify bottlenecks in the system and carry out the necessary optimization and improvements (Interviewees 1, 7, 8, 15).

Create dashboard for tracking chatbot behavioural metrics and success indicators after the launch. During the concept phase, the project team and sponsor define target metrics to measure the success of the project. After the chatbot launch, the team must also monitor the health of the bot and metrics to assess user behaviour and bot quality.

A dashboard prepared for the launch of the service makes it possible to quickly monitor the indicators of interest (Interviewees 12, 15).

Prepare and use development, testing and production environment. In most cases, a chatbot is a complex solution that consists of a number of information systems, the exchange of data between these systems, as well as the necessary hardware. Preparing a working production environment is a massive task that should not be underestimated, but must be solved as early as possible. The creation of a test environment, in addition to the production environment, allows the team to do full testing before releasing changes to the production environment (Interviewees 12, 14).

Organization related success factors.

Apply an agile iterative approach and MVP method. The use of the agile methodology is recommended by most of the interviewees (Interviewees 1, 2, 4, 6, 7, 8, 9, 11). In conditions of high unpredictability, agile approaches allow the development team to adapt to changes and adjust the backlog after testing every product iteration internally or on a pilot group. Publishing limited but well-developed functionality is better than planning to make and launch all the functionality in one day (Interviewee 10).

Regularly test your bot internally with your team, and with business experts in the company. Unlike customer testing, testing with company employees, who do not participate in the chatbot implementation project, can have additional benefits. Internal experts and account managers can provide new perspectives about the developing service and generate valuable ideas for future development (Interviewees 3, 7).

Pay attention to project control, reporting and communication with the contractor. Interviewee 9 asserts that it is important to establish trusting relationships both within your team and with contractors: “In our project, misunderstandings between project participants caused more difficulties than technical issues”. Project control and reporting are regular procedures related to checking the budget, volume and quality of the work done and how they meet the plan. Control procedures may vary in different

project methodologies, but in all cases, good project control can help ensure the success of the project (Interviewees 4, 6, 9).

Define the rollout procedures and assign responsibilities. Interviewee 6 claims that detailed planning of tasks for rolling out the new chatbot significantly reduces the risk of failures during the launch of the new service.

Define the chatbot maintenance team, their responsibilities and train the key users. After the launch of the chatbot, there will be new regular tasks to support and develop it. The team will need to monitor the operation of the service, register and fix bugs, update the knowledge base and train the AI algorithms. These functions should be assigned to the appropriate people in the organisation (Interviewees 1, 5, 6, 10). It may be necessary to hire new specialists. Employees will also need to be trained to perform these new functions (Interviewee 6).

Present the chatbot project to other departments. Explain the goals, objectives, and approach to the solution, and talk about the emerging needs of the team. According to Interviewee 7, it is important to demonstrate the value of the chatbot for the company and attract attention to the project related challenges and needs to obtain necessary support.

User needs and related chatbot performance success factors.

Test every product iteration on a small pilot group of real customers using real data. The result validation is a part of the recommended product and iterative approach. Interviewees 1, 2, 3, 4, 7, 8, 9, 10, 12, 13, 14 emphasize the importance of testing the new functionality of the bot with real customers, whose feedback allows the team to understand which features are valuable and which require improvement. At the execution phase, when the service has not yet been published, testing can be carried out on a small pilot group consisting of loyal customers. Interviewee 12 points out the need to use real data from production systems in testing and real historical customer

requests. This helps to simulate real situations and better prepare the service for launch.

Test UX and employ measurement tools which your platform offers. According to the interviewees, usability is the most important factor influencing the success of a bot. To work on improving usability, it is necessary to use various quantitative and qualitative methods and available platform tools for reporting and monitoring (2, 4, 5, 6, 7, 12). Interviewee 2 also recommends performing regular AB-tests to measure chatbot performance.

5.3.2.4 Operation phase

Technology related success factors.

Develop and update your technology. Update chatbot models. Chatbot platforms are evolving, new opportunities are emerging for existing platforms, new platforms appear. Language models also need to be updated, as various scientific communities and large technology companies regularly publish new versions of language models that better process natural language (Interviewees 2, 6, 8, 9).

Try new technologies, tools and methods to improve overall quality. ML and AL technology advances rapidly. It is important to explore new technical possibilities in order to keep the technologies used up to date and improve the quality of the service. Continuous research, the search for new opportunities, and testing them in practice will iteratively improve the quality of the existing service and help to develop new features (Interviewees 2, 8).

Monitor the chatbot availability and usage. Use the monitoring features of the chatbot platform to constantly monitor the operation of the service. Define monitoring procedures, and employees who will ensure the availability of the chatbot (Interviewees 3, 4, 6, 7, 9, 11).

Introduce versioning of bots and create an opportunity to compare the effectiveness of different versions. According to Interviewee 12, it is necessary to create and maintain

several successive versions of the chatbot. The parallel launch of the old and new versions makes it possible to quantitatively compare the effectiveness of the updates.

Organization related success factors.

Collect dialog data and invest time and resources in bot training. Interviewees 3, 4, 6, 7 state that continuous development and further bot training should be an ongoing process. Interviewee 11 asserts that bot training is critical after its launch and companies must form a dedicated team which performs this routine.

Develop the chatbot expertise and grow your team in-house. Team development is necessary to improve the quality of the chatbot and reduce dependence on the external contractor (Interviewees 2, 7, 14).

Advertise bot features and share success stories within your company. Popularization of the chatbot internally helps to get the support of the top-management and related departments. Such support encourages inclusion of the chatbot in the strategic roadmap of the company (Interviewees 7, 8).

Ensure that you can change the contractor if necessary and find alternative contractor options. Heavy reliance on a single external contractor poses a risk to the development of any service. Finding the alternatives will make the future development possible even if the current contractor or internal team cannot do it for any reason (Interviewee 1). Interviewee 2 discusses a possible option to buy a contractor team or find another form of a long-term partnership to ensure that required specialists will be available.

Train your team to edit your bot behaviour without contractor support (use the dialog editor or other tools). Many modern platforms offer tools for creating and editing chatbot behaviour in a convenient visual editor that does not require programming skills. Interviewee 1 recommends using the editor to update the chatbot more frequently and develop its features with less effort.

Continue to use the agile development approach. Turn it into a routine. Interviewee 2 argues that agile development methodologies should be used during the chatbot operation and for further development.

Retain the leading role of the product owner for further development. According to Interviewee 2, the role of the product owner is essential in maintaining the product management approach to project planning and backlog prioritization in line with business goals and user needs.

Make sure that the chatbot systems are accepted by IT support technical specialists. For stable and uninterrupted operation of the chatbot after its launch, it is necessary to determine IT specialists who maintain the hardware and software, fix errors, and install updates (Interviewee 3).

Keep t/he information provided by the bot up to date. The information that the chatbot provides to users in response to their requests needs to be regularly updated (Interviewee 4).

Create the product development roadmap. Once the project has been successfully launched, it is necessary to plan the further steps, update the objectives and create a roadmap for the development of the service (Interviewee 12).

User needs and related chatbot performance success factors.

Study your user needs by collecting feedback and plan new features accordingly. After switching to the chatbot operation, it is recommended by Interviewees 1, 3, 4, 6, 13, 14, 15 that chatbot teams continue the iterative development and plan new features according to user needs.

Monitor chatbot performance and identify which requests were not processed properly. This is a routine operation that enables using the data collected during the chatbot operation for gradual improvement of its scenarios and language models retraining (Interviewees 1, 2, 3, 4, 6, 7, 8, 9, 11, 15).

Advertise bot capabilities to its users and create respective promotion plan. The scepticism about the capabilities of chatbots and unwillingness to use conversational interfaces is one of the key challenges that hinders chatbot expansion. The situation can improve significantly if the launch and development of the chatbot is accompanied by a campaign that consistently advertises new features and explains the benefits of using the new service (Interviewees 2, 4, 6, 7, 8, 9). Interviewee 4 recommends using monetary or non-monetary rewards to popularise the chatbot. Interviewees 7, 8, 11 state that chatbot promotion should be done the same way as promotion of any new other digital service (website or mobile application) - perform media planning and plan appropriate advertising budget.

Monitor chatbot behavioural metrics and success indicators. Ensure that the chatbot achieves its objectives. The success metrics that were identified during the concept phase should be used in the operational phase. Ultimately, it is important for the business that the chatbot not only works well and is of interest to users, but also achieves the objectives (Interviewees 2, 3, 4, 5, 8, 12, 13, 14).

Collect qualitative data about chatbot performance to improve functionality. Some Interviewees (2, 4, 8, 9, 10, 12) note that it is especially important to conduct qualitative research in order to determine the direction of the chatbot development. For instance, Interviewee 10 explains how their team "discovered the fact that it is important for customers to know that they are not only communicating with a machine, but there is also a person who answers requests".

5.3.2.5 Success factors summary based on the interviews

Table 8 summarizes the critical success factors identified during the interviews. The findings described in sub-sections 5.3.2.1-5.3.2.4 can be combined in a single structured format which is based in the conceptual framework.

Table 8. Interviews findings. Success factors for chatbot implementation

What are the critical success factors for successful chatbot implementation?				
	Conception	**Definition**	**Execution**	**Operation**
Technology	• Explore vendor options and external service availability in your field and locality. • Identify and choose the most suitable. technology and vendor which meet your business requirements. • Analyse build and buy approaches to define your strategy. • Choose a platform that can provide detailed reports about your chatbot performance. • Analyse API of the selected platform and how to integrate it with the company's IS. • Study project portfolio of vendor candidates, request recommendations from their clients. • Involve your IT department and formulate comprehensive technical requirements for chatbot platform. • Ensure that the selected platform offers powerful testing tools. • Ensure that the selected platform has a powerful dialog editor	• Define scalability requirements and realistically estimate the required hardware. • Strategically plan the compatibility of the bot platform with the company's internal IT systems. • Invest in analysis and planning of system integration and data migration tasks. • Obtain necessary access to IS and solve information security issues. • Estimate and plan the required amount of hardware for the bot to work. • Develop a quick prototype to test the selected platform. • Formulate comprehensive functional requirements that determine the result.	• Consider the platform limitations when designing your bot behaviour. • Use SLAs (service level agreements) to set performance requirements for involved IS. • Perform load testing, and plan and prepare infrastructure for high load. • Create dashboard for tracking chatbot behavioural metrics and success indicators after the launch. • Prepare and use development, testing and production environment.	• Develop and update your technology. Update chatbot models. • Try new technologies, tools and methods to improve overall quality. • Monitor the chatbot availability and usage. • Introduce versioning of bots and create an opportunity to compare the effectiveness of different versions.
Organisation	• Convince the major stakeholders that chatbot is worth investing in. • Identify use cases and assess suitability of using a conversational UI. • Identify your aim, key success indicators and associated improvement metrics. • Prepare the ground for agile working. • Find a reliable chatbot integrator. • Find a chatbot expert to join your team	• Form a product team on the customer side which includes a product owner, analyst or dialog designer, UX-designer, data scientist, technical leader. • Communicate effectively your aim to your team, contractors, and top management. • Draw up a detailed project plan and assign responsibility for key tasks. • Use the MVP method and an iterative approach. • Find a responsible project leader from the business team who has the necessary expertise. • Pay attention to risk planning and management. • Coordinate project documentation with internal departments at the early stage of the project. • Ensure that the project knowledge is shared inside the team and not owned by one person. • Ensure your IT department is ready for the implementation phase. • Form a single team that includes your contractor(s).	• Apply an agile iterative approach and MVP method. • Regularly test your bot internally with your team, and with business experts in the company. • Pay attention to project control, reporting and communication with the contractor. • Define the rollout procedures and assign responsibilities. • Define the chatbot maintenance team, their responsibilities and train the key users. • Present the chatbot project to other departments.	• Collect dialog data and invest time and resources in bot training. • Develop chatbot expertise and grow your team in-house. • Advertise bot features and share success stories within your company. • Ensure that you can change the contractor if necessary and find alternative contractor options. • Train your team to edit your bot behaviour without contractor support (use the dialog editor or other tools). • Continue to use the agile development approach. Turn it into a routine. • Retain the leading role of the product owner for further development. • Make sure that the chatbot systems are accepted by IT support technical specialists. • Keep the information provided by the bot up to date. • Create the product development roadmap.
User Needs	• Limit your project scope. A few well-designed features are better than broader functionality of low quality design. • Analyse alternatives to the chatbot service. Specify why the chatbot is the best way to solve your problem. • Focus on one business objective. • Use a product approach and appropriate tools to study user needs. • The chatbot must be not only good for the company but designed to make the customer's life better.	• Develop simple and intuitive UX. • Design a chatbot personality which fits your brand communication style. • Focus on chatbot productivity. The ease, speed, and convenience of using chatbots are vital. • Make sure the chatbot is the most convenient way for users to solve their problems. • Use CJM to determine the user journey and specify chatbot requirements. • Plan methods and tools for collecting user feedback. • Apply blended communication approach.	• Test every product iteration on a small pilot group of real customers using real data. • Test UX and employ measurement tools which your platform offers.	• Study your user needs by collecting feedback and plan new features accordingly. • Monitor chatbot performance and identify which requests were not processed properly. • Advertise bot capabilities to its users and create respective promotion plan. • Monitor chatbot behavioural metrics and success indicators. • Collect qualitative data about chatbot performance to improve functionality.

5.4 Observation findings

The information provided in this section is a structured overview of the key phases of the chatbot implementation project in which the researcher participated as a team

member and observer. To create this material, the researcher used notes and written observations made during the project, documents and e-mails created by the project team, the results of meetings and workshops, as well as recollections of the participants and the researcher, which were noted by the latter.

The conclusions drawn from this research are not necessarily applicable in other companies and projects, but rather are the subjective judgments of an observer as a participant in a particular project. In sub-section 5.4.1, based on the received positive and negative experience, the challenges that the project team and the company encountered in the process of implementing the chatbot are listed, and a list of activities that can help other companies avoid similar problems or minimize losses is put forward.

Each of the four phases of chatbot implementation are analysed in sub-section 5.4.2, and success criteria that should be considered by teams planning to create a chatbot for their company are formulated. The pattern of structured interviews (see section 4.6) is used, these being considered the most convenient way to organize the observation, categorize the information received, and arrange it in a structure that can help to achieve the ROs.

5.4.1 Challenges which companies face when implementing chatbot projects

Technology related challenges.

Despite the impressive achievements in the field of AI, in practice, the technological capabilities of companies to create an effective assistant are very limited. The development of virtual assistants and the use of machine learning algorithms to solve business problems is a very popular topic that is widely covered in professional media, conferences, and reports. Demonstrations of the achievements of chatbots from industry leaders such as Google, Facebook and Amazon are impressive. It seems that today the possibilities of chatbots are endless, they can answer any user's question and solve any

problem. In practice, most of the latest achievements in this area are not available to companies for solving their practical problems, since the above examples are created using huge computing resources, and material investments under the guidance of the best researchers in this field. Moreover, when looking at open domain chatbots in more detail, it becomes clear that they are really good at emulating human behaviour in general conversations. At the same time, however, they are completely inappropriate for creating a goal-oriented bot, which is designed to solve a specific user task and act within predetermined boundaries. All this often creates inflated expectations among inexperienced teams about the unlimited possibilities of technology and a **lack of understanding of the complexity** of the project. At the start, the ESteelCo team, which did not have much practical experience in implementing bots, formed a distorted understanding of its capabilities. It seemed that it was necessary to choose an advanced solution from one of the market leaders to get an excellent virtual assistant. Further, at the stage of choosing a contractor, with a deeper understanding of the subject area, we gradually began to realize the complexity of the task ahead, and numerous technological limitations.

Despite the availability of cloud solutions from large well-known vendors (IBM, Google), as well as a huge number of smaller players, **choosing the right platform can be a very difficult task, due to possible restrictions or special requirements**. For example, in the case of ESteelCo, the team refused to use cloud solutions for information security considerations and local requirements for the processing and storage of personal data. Further, following the obvious requirement to choose a solution that works well with the Russian language and includes the appropriate language modules, the choice of vendor was narrowed down to just a few players who are leaders in the Russian market.

The general immaturity of the market, the large number of little-known players, the lack of many years of successful experience in the implementation of chatbots, make it difficult to choose the most suitable vendor. At the same time, even choosing the most suitable vendor does not guarantee successful cooperation, since they may not have

sufficient resources and experience to cope with your specific task. The ESteelCo team chose a supplier that had the strongest market expertise in solving applied machine learning problems, owned proven Russian language models, and also used various open-source programs in building the solution architecture. The weak side turned out to be project management and the quality of the process of providing services, which are significantly lower compared to leading IT integrators.

Except in the simplest cases, a modern chatbot is not a single piece of software. Mostly, it is a complex multi-component system, which may consist of components that are produced by different companies and use different technologies. **A chatbot is much more complex and expensive than it seems, and not all project participants may be ready to deal with such complexity and invest in this new technology adoption.** For instance, the ESteelCo chatbot comprises a popular open-source dialogue framework Rasa, Botfront conversation editor, language analysis and Russian language models developed by the integrator, connectors to popular messaging platforms, and some other smaller components which connect these modules together. In practice, it may turn out that the actual time frame for deploying a working solution can significantly exceed initial expectations, and the cost of hardware and IT consulting can be comparable to the costs of new CRM integration or other large IT projects.

The following actions could help companies to overcome these technology related challenges:

- Chatbot integration is a relatively new service, and it is, therefore, difficult to evaluate a service provider by analysing its experience and reputation. The selection of a platform and a contractor should be based on a study of its successful projects that have similar goals and functionality to yours. Ideally, one can try to interact with their real publicly available bots, study their work, examine the strengths and weaknesses of the solutions.
- Studying the cases of other companies will help to understand what business tasks could be effectively solved using a chatbot. Ideally, the chatbot

implementation project team can meet with the other companies' project teams, whose experience is most interesting and relevant, to discuss their experience. Such a study can help with obtaining a realistic idea of the complexity of the upcoming task, technological limitations, and evaluate the approximate cost and time that is normally needed for developing an assistant.

Organisation related challenges.

Lack of clarity concerning the project goal, user problems to solve, and rationale for a chatbot solution can result in poor project planning, redundant functionality, increased budget, and project time extension. In the ESteelCo case, the task was well formulated at a high level by management, but detailed answers to these questions were not given, and each team member understood the task in his or her own way. At a later stage of the project, closer to the finalization of development and preparation for the pilot launch, the project team realized the need to formally describe the goals of the project, the problem that the bot was geared to solve and its key functionality. It was decided that the most valuable thing in a bot for a client is the ability to provide him or her with information on the order status almost instantly. It was the functionality that was mostly optimized before launch, trying to make it perfect, avoiding the investment of resources in the development of other complex secondary functionality.

ESteelCo has well established practices for using agile methodologies for project development and planning. The chatbot project was initially planned in compliance with the basic principles of MVP method and agile methodologies. However, many of the basic principles were soon contravened or not fully applied. The requirements for the first version of the product turned out to be very complex and sometimes redundant. The team tried to describe their wishes in detail and include in the project scope the more technical and functional requirements they could receive from the stakeholders. The resulting project plan, which became part of the contract with the integrator company, was based upon a waterfall approach, according to which within a six-month period it was necessary to write the full set of dialog scripts, deploy the

chatbot system, integrate a new CRM system, integrate data flows, implement all required chatbot scenarios, test them and launch a fully working service. The project was significantly complicated by the fact that the implementation of many functions required the implementation of a new CRM system, which became a side project and involved another IT integrator company. This project, which seemed simple at the concept phase, gradually became more detailed, supplemented with new requirements for internal IS and process changes, and turned into a complex project with a lot of risks. In an attempt to minimize risks, the team had to break some rules of agile methodologies, specified the formal requirements for the bot behaviour, included all the planned scenarios in the contract and specifications, listed the criteria for accepting the result, and often formulated requirements that were difficult or even impossible to implement.

On the other side, the vendors protected their interest and attempted to minimize the unplanned work by including a lot of restrictions in the contract, which were often excessive. Such a traditional project management approach and the type of relationship between the customer and the contractor are often used in projects where the planned result can be strictly formalized. In this case, the inability to use agile methodologies and an iterative approach deprived the team of the opportunity to experiment during the project implementation, led to the omission of implementation scenarios that the users do not need, and a failure to find, create, and pilot solutions that could make the service excellent. Realizing this around the middle of the development phase, the team decided to apply the agile approach. Instead of continuing to develop all the planned functionality, the team focused on the 20-30% of the most important scenarios that seemed to be the most valuable for the users. The most important task was to finalize these scenarios and test the result on a pilot group as soon as possible. This change dramatically improved the situation - within a month, the team managed to implement a working product and present it to a pilot group of clients, collect feedback, adjust the project backlog, and omit complex, expensive and unnecessary functions. Such

behaviour of the project participants may be the result of insufficient market maturity, and lack of experience of both customer companies and chatbot integrators.

Experienced IT specialists often apply their past experience to chatbot implementation projects without a complete understanding the specifics of the latter. The high level of unpredictability inherent in AI application projects, the associated feeling of uncertainty, and the desire to eliminate this uncertainty dramatically slow down teams, and make the development process bureaucratic and inflexible. **The low level of trust between customers and contractors, due in part to the absence of many years of successful cooperation** in the development and implementation of virtual assistants, made this situation even more difficult because it reduced the creativity of teams and decreased the potential to create a high quality and user-friendly service.

As in any other rapidly developing industry, **there is a lack of necessary specialists who can form a chatbot development team**. When a company is just trying to create a virtual assistant for the first time, it is unlikely to find suitable specialists with the full range of skills and required experience among its employees. A small bot implementation project team may consist of a product manager or project leader, a technical leader, and a scenario designer. The ESteelCo team did not plan to hire new specialists for the project, appointing existing employees as a project manager, technical leader and analyst. All of them combined work in the project with their previous responsibilities in the marketing and IT departments. The lack of necessary competencies was ameliorated by involving specialists from the integrator, self-training of the team, and also by involving the researcher in the role of analyst and internal consultant, as he already had valuable practical experience in implementing bots, and also studied this area in graduate school. During the implementation phase, the team was extended by two new members who were fully dedicated to the project. However, none of them had experience in implementing chatbots and were able to significantly strengthen the team only in terms of an additional resource, but not as regards chatbot expertise.

The following actions could help companies to overcome these organisation related challenges:

- At the earliest stage of the project, it is important to define its goal, formulate the problem and determine why a chatbot is the best solution. The formulation of answers to these questions provides direction for the further course of the project, the choice of platform, contractors, and the implementation.
- The use of agile project management methodologies in combination with the MVP method will enable the project to progress with short iterations, focus on the working product but not on the process, and test each iteration involving the end users. This approach helps teams to cope with the high level of unpredictability inherent in AI projects, manage frequent changes, and work on finding the best solution for the users.
- One or more experts in the chatbot area will dramatically strengthen the customer's team. The participation of a specialist should help to avoid many mistakes at all phases of the project from the concept phase to the launch and maintenance of the service. Possible solutions include hiring an appropriate specialist, searching within the company, or involving an external independent consultant.

User needs and related chatbot performance challenges.

At the moment, there is no single approach or best technology that allows companies to create the best goal-oriented bot which operates in a specific domain. **The selection process for the appropriate set of software tools and technologies to use is challenging.** The most advanced ML models, trained on huge data sets, can emulate conversation on almost any topic. However, they are not well-suited for creating applied assistants that must follow a specific scenario or several scenarios, not deviate in communication from this scenario, strictly answer a question posed by the user, or sequentially perform a transactional operation, asking a user to input specific data. The opposite is the primitive bots of the previous generation, which were based on strict scripted scenarios

or use finite-state machine principles and conditional transitions. For the convenience of users, such bots often use a list of predefined answers in their interface, which a user gives by pressing buttons or entering numbers corresponding to the answer. By using this approach, bot designers restrict users to input information in a free format, which is more like an ordinary on-screen menu or an IVR (Interactive Voice Response) menu used in call centres. Obviously, from the point of view of a user, such a solution can hardly be called an intelligent replacement for a human assistant, but it has its advantages. The button interface predetermines the actions available to a user at a particular step, which in some situations can help a user by eliminating the need to formulate the answer, and also giving him or her an explicit understanding of which answer options can be accepted by the bot. In practice, many successful virtual assistants combine both approaches. NLU models a widely applied for processing user requests formulated in human language in a free form are effective in determining the client's intention. Strict scenario-based solutions and button interfaces can be used effectively to describe the general structure of a dialogue or its parts, where the restriction of actions is expedient and even convenient for a user, as it helps to select quickly the most relevant answer. During the testing of a ready-made solution in a focus group, the ESteelCo chatbot development team came to the decision that for such user actions as user agreement confirmation, typing registration data, and some other strait forward steps, it is more appropriate to use the scripted-based approach. A less restricted communication mode, which enables users to enter any text, is used at the beginning of the dialog, when it is necessary to let the user to formulate his or her request in a free text form and determine the intention. For companies implementing chatbots, in practice, all this means is that using the most advanced platform may not necessarily lead to a perfect user-friendly solution. It will require chatbot oriented UI specialists, technical experts, and experienced chatbot scenario designers to combine various approaches to create a well performing solution.

During the platform selection, the ESteelCo team analysed many products available on the market in various price ranges. Particular attention was drawn to cloud chatbot builders, which claim to offer all necessary tools to create a working service in a very short time, whilst the subscription fee seemed to be very attractive. After a more detailed study with the involvement of an external expert, all team members concluded that such cloud services are suitable for creating primitive bots that require a user to enter their requests using button menu and are not able to recognize and process natural language. The limitations of such services did not allow us to seriously consider them for the creation of our project due to insufficient functionality. The project team also discussed their own user experience of communicating with the bots of various companies that were created using simple builders. The participants concluded that such **popularity of low-quality primitive bots negatively affects the whole industry because they leave a rather negative impression after use. As a result, many people avoid contact with any virtual assistant from thereon**.

The following actions could help companies to overcome these user needs and related chatbot performance challenges:

- When choosing a platform and integrator, do not choose the most complex system. It is more important to make sure that the software or a set of software systems is the best fit for creating the exact assistant behaviour that will make users like the new service.
- User experience (UX) is an important element of the project work. The project team should have an experienced UX-specialist whose task is to design an excellent user experience with available technology, measuring behavioural metrics and processing customer feedback.

The use of the common table structure prepared both for interviews and for organizing data obtained during observation allows the above to be presented in a more compact standard format. Table 5.3.1.1 lists the key challenges companies face when implementing chatbots, according to the observer.

Table 9. Observation findings. Challenges which companies face when implementing chatbot projects

Challenges which companies face when implementing chatbot projects		
Area	What are the main challenges which companies face when implementing chatbot projects?	What are the actions which companies could perform to overcome these challenges?
Factor related areas:		
Technology related	Despite the impressive achievements in the field of AI, in practice, the technological capabilities of companies to create an effective assistant are very limited Lack of understanding of the complexity of chatbot projects The general immaturity of the market, the large number of little-known players, the lack of many years of successful experience in the implementation of chatbots make it difficult to choose the most suitable vendor A chatbot is much more complex and expensive than it seems, and not all project participants may be ready to deal with such complexity and invest in this new technology adoption	The selection of a platform and a contractor should be based on a study of successful projects undertaken by the contractor that have similar goals and functionality to yours Studying the cases of other companies will help to understand what business tasks could be effectively solved using a chatbot
Organisation related (Strategy, Structure, Employees, Communication, Project management, etc)	Lack of clarity concerning the project goal, user problems to solve, and rationale for a chatbot solution can result in poor project planning, redundant functionality, increased budget, and project time extension The low level of trust between customers and contractors, due in part to the absence of many years of successful cooperation Lack of necessary specialists who can form a chatbot development team	At the earliest stage of the project, define its goal, formulate the problem and answer the question of why a chatbot is the best solution The use of agile project management methodologies in combination with the MVP method will enable the project to progress with short iterations, focus on the working product but not on the process, and test each iteration involving the end users Find a chatbot expert who can join your team or support as a consultant Use COBIT 2019 or another governance framework
User needs and chatbot performance related	The selection process of the appropriate set of software tools and technologies to use is challenging Popularity of low-quality primitive bots negatively affects the whole industry because they leave a rather negative impression after use	When choosing a platform and integrator make sure that the software is the best fit for creating the exact assistant behaviour that will make users like the new service Find a user experience (UX) specialist to join your team

5.4.2 Critical success factors

5.4.2.1 Conception phase

Technology related success factors.

Define criteria for the chatbot platform, list the requirements and choose among those vendors who can demonstrate that their platform meets the requirements. Ideally, every feature which is needed for your bot can be viewed in a demo environment or can be tried by communicating with the real working assistant implemented for previous clients. The ESteelCo marketing team determined the key criteria for the platform which comprises basic feature description and main chatbot scenarios, communication channels (WhatsApp and Telegram), requirements for integration interfaces, reporting tools, dialog editor, and NLP module which should effectively process in the natural Russian language. To align with information security requirements, the chatbot had to be deployed on the company's servers.

Another important requirement was the use of either open-source software or proprietary software with the rights to use it, and further developments are fully transferred to the customer at the end of the project. The selected contractor met all the requirements well. However, during the pre-sale process, the customer team accepted some vendor feature descriptions without detailed verification. Later, it turned out that some of the declared functionality - for example, the dialogue editor - did not work as expected, and the teams needed extra effort and time to improve and integrate it.

When choosing a vendor, it is important to ensure that you can develop the bot on your own or change the integrator company, if necessary. As noted above, one essential requirement defined by the ESteelCo team was that the entire solution should be based on the open-source systems or/and software developed by the vendor which can be later transferred to the customer with its source code. During the vendor selection process, the team received several offers from small companies which run customer

chatbots in a cloud or use their proprietary technology without permission to work with its source code. These vendors were not considered because the dependence on the technology of one small vendor presents too high a risk related to their reliability, resource availability, future development, and pricing policy. Therefore, one of the most important criteria for choosing a platform can be the open source technology used and the size of the developer community. All of this significantly reduces the risk of vendor lock and gives the company access to a large number of integrators, as well as the ability to build its own internal team.

Organization related success factors.

The business objective and metrics that measure the success of the project must be clearly defined. For many clients, the speed and accuracy of the manager's response to their question is the most important indicator of a good service. Automation of the manager's work and instant processing of customer requests dramatically improve the quality of service. **Providing immediate response for clients** was defined as the main business objective. It was much more difficult for the project team to find the right metrics to measure the success of the project. Having experience in creating commercial services, the marketing team was well aware that the work of the chatbot, like the work of any other digital product, should be measured by the appropriate metrics that are used in the professional community. The study of the practices of other companies and publications of experts led to the fact that we had about seven different indicators, all of which seemed relevant:

- Total number of users
- Goal Completion Rate
- User Satisfaction
- Human handover rate
- Bounce rate
- Retention rate
- Average response time

The team agreed that it is ideal to measure all these parameters but after much debate, they concluded that they had to choose one or two main indicators which best measure success. These measures should be closely linked with the main objective – providing immediate response for the clients. Goal Completion Rate (GCR) and User Satisfaction demonstrate how well the chatbot can answer user questions and how the users rate the overall quality of the new service.

Study successful cases of using chatbots by companies in your industry and evaluate how a chatbot is suitable for solving your problem. The marketing function of metallurgy companies is quite conservative, so no successful comparables were found as exemplars of chatbot deployment. However, the ESteelCo marketing team was filled with the desire to offer its customers a new modern service and a way to communicate in instant messengers, which have become the norm for customers in everyday life. It was hypothesized that a chatbot could be the most convenient and effective way to get feedback from customers and enable them to receive quick answers to the most common questions about transactions. However, the team could invest more time in exploring successful chatbot applications in the global metallurgy market or study successful cases of B2B companies in other areas. This would help to better understand the limitations of the technology and more realistically assess the amount of work ahead and the complexity of the project.

Ensure there is a chatbot expert in the project team. The absence of a specialist with solid relevant experience in planning, developing and operating chatbots significantly increases the risks of the project, and even at the initial phase of the project, when choosing a vendor and defining goals, it can lead to wrong decisions, which may later cause significant negative consequences or even project failure. The researcher joined the ESteelCo team as a consultant and analyst to support the project from the very beginning. In particular, with the help of the consultant, the criteria for choosing a suitable platform were formulated and justified, and a review of the platforms available was made. Further, the project team learned the main technical approaches used to

create modern chatbots. When communicating with potential vendors, the consultant drew the team's attention to the need to check the most important characteristics of the proposed platforms.

User needs and related chatbot performance success factors.

Make sure a chatbot is the best way to solve the client's problem. As mentioned above, the client's communication with the company was carried out only through the manager, whose quality of work, including availability and speed, determined the quality of the service. There was no convenient personal account page on the company's website or a mobile application, and there was no demand from the client for such services. Clients were quite satisfied with communication with a personal account manager by phone, e-mail, and instant messengers, except for the speed of response. The chatbot seemed like a great option, which was supposed to provide an instant response to the client through messengers that were already actively used in communication.

5.4.2.2 Definition phase

Technology related success factors.

Calculate required hardware resources and plan necessary budget. Chatbots like many other software solutions that use AI require significant hardware resources. The IT team should be realistic about the amount of hardware that will be required for a production system, test and development environment. The ESteelCo chatbot project team relied on the expertise of the integrator to correctly plan the number and characteristics of the servers that would be required. Later, difficulties with their purchase and installation nevertheless arose due to the global shortage of processors and the increase in delivery times during the covid period. However, all these difficulties did not affect the timing of the project, as the integrator provided the necessary servers for the development and testing at the implementation phase.

Take into account all integration requirements with other corporate systems. The work of the ESteelCo team on the analysis and planning of integration with the company IS, as well as the deployment of new systems that will be required to implement the chatbot, began when the concept of the project was discussed. The chatbot scenarios involved obtaining data for customer profiles and order statuses from the ERP system. Designing the proper architecture solution became a main task that involved IT leaders responsible for infrastructure and ERP development. The target scheme assumed that the chatbot would act as an interface for interacting with clients, and the majority of the work was related to organizing the communication between systems and deploying a new CRM system (see Figure 5.2.1). The latter was required as a system that will import transactional data from the ERP, store customer profiles, manage customer notifications (including messages delivered via the chatbot), and also provide account managers with the necessary functionality for processing customer requests. The resulting scheme and the solution description were submitted for analysis to the information security department. It should be noted that the analysis of a chatbot architecture is not a typical task for the information security department. As a new type of project, it required time to study, so the discussion and refinement of the requirements for the project, taking into account the minimization of information security risks, took more than 1 month, but did not impede the development of the service itself.

Organization related success factors.

Present the project goal, plan, and project management approach to the top managers. The involvement of the top management of the company and the project sponsor is essential to agree on goals, budget, and project plan. Most likely, they do not have much experience in successfully implementing chatbots, and therefore their understanding of the complexity of the project and the required resources may be very different from reality. To justify the chosen goal of the project, the metrics that measure success, technology, vendor, and costs, it is necessary to ensure senior management

appreciate the essentials of chatbot technology deployment. Demonstrations of successful cases and examples of real bots, discussions about real opportunities and limitations enable the stakeholders to better understand the real amount of effort required to create a good service, as well as imagine what the first version of their company's bot could be. The ESteelCo Sales Division organizes a quarterly event called the Customer Focus. It is a workshop where the marketing and sales teams, including the top management of the company, work on various ideas and projects that are aimed to improve customer service. The chatbot team took the opportunity to present their new project to the audience. The presentation included a summary of the project, but the focus was on showing real examples of working chatbots in banking and retailer areas. Visual examples of what chatbots can do and what problems are still difficult to solve, supported by a story about the technologies used to create bots, well illustrated the opportunities for improving the customer service, and helped to understand the upcoming challenges. The project was supported by stakeholders, and the team received useful recommendations and ideas on the new bot features.

Form a project team and allocate their resource to work on the project. Initially, the project team consisted of three people - the project leader, the analyst, and the researcher, who joined the team as an internal consultant and expert. The EFM project and the idea of developing a chatbot as a new way to communicate with the clients was an experiment of the marketing team, and not a new strategic way for the company. Therefore, it was not supposed to create a fully dedicated team, which should spend 100% of their time on this project. Most of the work was to be carried out with the involvement of external contractors. The project manager took over the main functions of project management (concept development, planning, control), and the analyst from the marketing department acted as a dialogue designer. Both the analyst and the researcher supported the project manager in preparing the project plan, selection of the platform and integrators, as well as in all subsequent phases of the project, including development and launch. The overall workload of the team and re-deployment to other

more important tasks had a negative impact on the speed of solving the key tasks of the chatbot project, as well as on the quality of the result. Instead of one month, as originally planned, the team took twice as long time to complete the definition phase, due to the fact that this phase of the project required team to perform a large amount of work for requirements formulation, writing and approving dialogue scenarios, development and approval IT architecture with the stakeholders. The project participants understood that it was impossible to create a fully dedicated team for this project, and the existing organizational structure was a compromise that allowed the team to launch the project and achieve the goals by accepting certain risks associated with the time required for implementation and launch of the bot.

Agree with integrators to use an agile methodology and an iterative approach, and make sure that your contractual terms do not conflict with this approach. All project participants (teams of the customer and both integrators) were familiar with Scrum and have previously applied it in practice. An iterative approach was also discussed and seemed to be the most correct way to achieve the project goal. However, in practice, the teams began to work according to the waterfall model, first conducting research and preparing a comprehensive description of the requirements for the system, and only then proceeding to the development. The reason for this was the contract with the integrators, which assumed the phased work on the project with a fixed scope of work and the cost at each phase. The working service had to be presented at the very end of the project. It should be noted that such a waterfall approach was uncomfortable for integrators and for the customer team. During the implementation phase, there were situations when following the initial requirements was not feasible, and the participants proposed more effective solutions. However, teams often had to choose between being creative and developing the best solution for the user and sticking to the original plan. The solution that should help to avoid such situations may be the appropriate preparation of the contract. Participants must agree on the chosen iterative approach and create appropriate conditions in the contract. In particular, they should avoid

describing in detail the functionality of the future service and to make a precise assessment of the development cost. Instead, they should use an approach that allows hiring of specialists using time and material model, shorter iterations that allow the trialling of created functionality much earlier and adjustment of the scope of subsequent work based on the experience gained from the previous iteration.

User needs and related chatbot performance success factors.

Apply an iterative approach and formulate criteria for your first MVP. Despite the intention of the teams to use an iterative approach and the MVP method, the contract conditions require detailed planning first, and then a long development phase. The MVP itself was well formulated, but the main problem was its volume. In fact, the composition of the first MVP included too many features from the list of all initially planned functionality.

Choose the "easy-to-develop" functionality, but ensure that the users determine the scope of your first MVP. When planning the project and discussing the required functionality, it is inappropriate and self-defeating to try to find and include all the features that could be useful to the user. Even though the team conducted research and identified user needs, it was difficult to guess which set of functions would be most useful in practice. For example, the FAQ functionality, which seemed basic and mandatory, required significant resources for its implementation, but after the launch of the service, it was found that it was not of great interest to users, but rather distracted them. Later, after the launch of the bot, while conducting a retrospective of the first stage, the team concluded that it would be more efficient to reduce the scope of the first MVP to the absolute minimum. A question about a user's order status is the most common request. Thus, the first version of the chatbot could offer the users only one core feature – tracking their order status and informing them when it changes.

5.4.2.3 Execution phase

Technology related success factors.

Prepare the production environment in advance, test the data exchanges and the accessibility of the service for the client. The preparation of production servers began at the execution phase and was carried out in parallel with the development of the chatbot. Despite the delay in the delivery of server hardware mentioned above, it was ready before the bot was launched, because the development of the bot itself took about 6 months. Two main challenges that the team faced while setting up the servers were: 1. the chatbot consisted of many modules and related systems that required installation and configuration; 2. Corporate information security systems had to be correctly set up because the bot was not accessible via instant messengers. The deployed and configured chatbot did not send messages to Telegrams and WhatsApp due to network restrictions. Additional work was required to analyse, negotiate, and change the network settings to ensure seamless messaging with external messenger platforms.

Organization related success factors.

Use an agile methodology like Scrum to develop your service iteratively. The development of the whole project was carried out by two teams: the development team of the chatbot itself and the team of the CRM system integrator. Both teams used the Agile Scrum methodology (described in details in section 2.5.2), using the typical two-week development cycle (sprint) and involved the customer in planning activities and demonstration. This approach worked well, except when the problem was somewhere outside the responsibility of a particular integrator and required the participation of both teams to solve it. To improve the resolution of such problems, approximately in the middle of the development phase, weekly status meetings in which both teams participated were scheduled, and an informal project chat was created, which included project managers and lead developers of the teams.

Avoid unreasonable scope creep. Various stakeholders of the project, as well as involved experts from the company, tend to generate many new ideas and fairly criticize the new product. The constant flow of ideas and suggestions puts pressure on the team, which

gives rise to a desire to change product requirements and include new features in the scope. The inaccuracy of the initial requirements and the readiness of the integrator to respond to customer requests led to unplanned FAC functionality being included in the work plan which increased in volume. However, the project manager took timely action, and the development of new functionality was suspended until the completion of the already planned work. The team concluded that the desire to hear different opinions and get new interesting ideas should not lead to a loss of team focus on the speedy creation and release of the first version of the product and the subsequent feedback and quantitative metrics from users.

User needs and related chatbot performance success factors.

Test the first prototype and product versions on your employees who are not involved in your project. Testing the first version of a product, or even a prototype, with other company employees is a simple yet effective way to improve and prepare any new service for launch. Ideally, test participants are not involved in the development of the application and are not familiar with its features. This approach also applies to chatbots. ESteelCo account managers are very experienced in dealing with clients and have the best understanding of their main problems and needs. However, most of them were not directly involved in the work on the chatbot. By choosing the most active managers, a test group was formed that used the very first versions of the chatbot, critically evaluated the functionality, and made recommendations for improving the user experience.

5.4.2.4 Operation phase

Technology related success factors.

Analyse all your existing platform features, and follow recent updates to find out how they can be applied to improve your service. The prioritization of new tasks depends not only on their importance for users or the company, but also on the effort required for their development. That is why it is important to have a good understanding of what

capabilities and potential your platform has. It is also important to keep track of all platform updates, which usually solve known security problems, performance issues, fix bugs, and often add new features to the existing feature set. The EFM Chatbot is based on the Rasa Open-Source platform and uses the Botfront dialog designer. Analysing the needs of users, the company goals and the capabilities of these two platforms together with the integrator, the following areas have been identified that could be easily developed using existing platform capabilities:

- Use the slot filling technique to dialogue scripts to reduce script length and complexity.
- Analyse reports of the dialog module about the bot failures, and use the dialogue editor section, which allows editors to gradually supplement and train the existing language model with new phrases.
- Learn and utilise the features of the dialog editor which may enable the team to create a large number of new useful scenarios that do not require programming.

Organization related success factors.

Redefine the roles of the team members and their involvement in the project. After the service had been launched, the approach to its development changed. The project approach, which comprised the budget, deadlines, scope of work, as well as dedicated customer and integrator teams, was replaced by the support and maintenance activity. The main changes in the roles of participants were:

- Switched from fixed price to time and material contract model with the integrators. Their developers became available to implement new features by request.
- The project manager remained as the project leader but reduced his involvement and focused more on improving the customer experience and achieving the project success criteria.
- The analyst was assigned to the project for 100% of his time. His new main responsibilities were: customer development, test and accept newly developed

features, formulate and describe new tasks, manage the product backlog and discuss task priorities with the stakeholders, design new dialog scenarios, update chatbot content.

- A chatbot developer joined the company team to implement programming tasks and develop company internal chatbot expertise.
- The entire software solution was documented by the integrators and transferred to the IT department for support and maintenance.
- The chatbot consultant reduced his workload and became available to support the team by request or for periodic monitoring and analysis of key metrics.

Continue to use an agile approach. Any IT service continues to evolve after being put into operation. The process of planning and new feature development should be flexible and manageable to enable the future growth with respect of the needs of the business team and interests of the users. After launching the first version of the chatbot, the team continued the iterative development process and used the Scrum methodology. The flow of ideas and change requests, which formed the backlog, consisted mainly of three categories:

1. Previously known tasks and functionality, the development of which was not included in the first version.
2. Ideas that were generated by the project team, integrators, as well as company employees who are not directly involved in the project, for example, account managers.
3. Insights gained from user experience research which included interviews, surveys, and report analysis.

User needs and related chatbot performance success factors.

Involve users to constantly work on the development of your service. Preparing the first version for launch and testing it on a pilot group of real customers, the team understood very well that what the project team think users need, and what users really need, can be very different. Chatbot, being an alternative to other ways of

communication between the customers and the company, can be successful if its users really like it. Having made a few mistakes – such as the development of too complex functionality that did not turn out to be useful - the team realized that the success of the further development of the service depends on collaboration with the users. To do so the team performed the following activities: in-depth interviews, regular surveys, testing new functionality on a pilot group, and tracking behavioural metrics using the platform's capabilities.

Track the key chatbot metrics and create a dashboard which displays them. After the successful launch of the chatbot, it was important not only to expand its capabilities and improve user behaviour, but also to check how the result corresponded to the initially defined project goals. The ESteelCo team considered the project success based on the results of measuring User Satisfaction through a survey. However, a methodology for measuring the other main indicator of GCR was only in development. One of the most immediate plans was to create a report that displays key project success metrics, user behavioural metrics, and technical parameters of the platform. The most monitored technical and behavioural metrics used are the **total number of users**, which allows the team to track the growth of the chatbot's popularity among customers, and the **average response time**, which provides a quick snapshot of the platform's technical health. **User satisfaction** is used as a key business metric that measures the overall quality of a chatbot and its value to clients. It is measured by a survey sent to a small percentage of users at random after they have finished interacting with the chatbot. Half a year after the launch of the chatbot, more than 80% of ESteelCo customers rated the quality of the service highly and answered positively to the question "Did the bot solve your problem?". Goal completion rate (GCR), a metric that the team originally considered as one of the most important, is not used. Since the ESteelCo chatbot has few transactional scenarios and most of the customer requests are more informational in nature, the team was unable to formulate a proper approach to

measuring this indicator. At the same time, measuring User Satisfaction proved to be sufficient.

5.4.2.5 Success factors summary based on observation

Table 10 summarizes the success factors that are described and explained in this sub-section. The success factors identified during observation are framed using a conceptual model template that enables standardization of findings and streamlines the data analysis process.

Table 10. Observation findings. Success factors for chatbot implementation

What are the critical success factors for successful chatbot implementation?				
	Conception	**Definition**	**Execution**	**Operation**
Technology	Define criteria for the chatbot platform, list the requirements and choose among those vendors who can demonstrate that their platform meets the requirements. When choosing a vendor, make sure you know exactly how you can develop the bot on your own or change the integrator company, if necessary.	Calculate required hardware resources and plan necessary budget. Take into account all integration requirements with other corporate systems.	Prepare the production environment in advance, test the data exchanges and the accessibility of the service for the client.	Analyse all your existing platform features, and follow recent updates to find out how they can be applied to improve your service.
Organisation	The business objective and metrics that measure the success of the project must be clearly defined. Study successful cases of using chatbots by companies in your industry and evaluate how a chatbot is suitable for solving your problem. Ensure there is a chatbot expert in the project team.	Present the project goal, plan, and project management approach to the top managers. Form a project team and allocate their resource to work on the project. Agree with integrators to use an agile methodology and an iterative approach, and make sure that your contractual terms do not conflict with this approach.	Use an agile methodology like Scrum to develop your service iteratively. Avoid unreasonable scope creep.	Redefine the roles of the team members and their involvement in the project. Continue to use an agile approach.
User needs	Make sure a chatbot is the best way to solve the client problem.	Apply an iterative approach and formulate criteria for your first MVP. Choose the "easy-to-develop" functionality, but at the same ensure that the users determine the scope of your first MVP.	Test the first prototype and product versions on your employees who are not involved in your project.	Involve users to constantly work on the development of your service. Track the key chatbot metrics and create a dashboard which displays them.

5.5 Summary

The information presented in this chapter is the result of processing research data obtained during interviews and through observation. The opinions and views of 15

interviewees were arranged into two sections according to the two main questions asked. Sub-section 5.3.1 lists the challenges that, according to the interviewees, companies face during the chatbot implementation. The mentioned critical success factors that lead to successful chatbot implementation are presented in sub-section 5.3.2.5 in a table that uses the structure of the conceptual model. The observation findings are presented in section 5.4. in the same format.

Despite significant differences in individual skills, industry experience and cultural context, the findings contain many similar or complementary statements. At the same time, the differences can be explained by the varying experience of specialists and their qualifications in a range of different fields. The senior specialists and experienced managers tend to express more generalised and consistent views, and discuss tendencies rather than focusing on the special cases. The juniors, on the other hand, pay more attention to recent experiences, and their recommendations are more likely to reflect the desire to avoid repeating mistakes in the future. All these opinions and beliefs are further used by the researcher for analysis and interpretation in order to address the ROs. The data analysis procedures with respective conclusions are discussed in Chapter 6.

6 Analysis and discussion

6.1 Introduction

This chapter is focused on the analysis and interpretation of the previously obtained data. Using the triangulation approach, the researcher combines data from the literature review (chapter 2), interviews (section 5.3) and observations (section 5.4). The data from these three sources are combined, processed, and analysed according to the procedures described in section 4.8. This approach is used to address RO1 and RO2 with the results being presented in the following sections 6.2 and 6.3. The outcome of the investigation and assessment of the main challenges, which companies face when implementing chatbot projects, are presented in section 6.2. This is followed by section 6.3 with a presentation of the critical success factors for successful chatbot implementation identified in this study. RO3 is addressed in section 6.4 where the findings are analysed, presented, and discussed. The result of the study, based on the conceptual model, is further analysed, and discussed to formulate a new improved framework which can aid the manageability of chatbot implementation and support project teams in delivering expected outcomes. The next section 6.5 presents the validation process based on the discussion with five experts and the questionnaire sent to them to ensure the relevance and validity of the new framework. Finally, section 6.6 provides a comprehensive description of the results, focusing on the practical application of the framework. Presented as a guide, the material can be used to support chatbot implementation projects in practice.

6.2 Challenges which companies face when implementing chatbot projects

Research data were analysed, processed, and interpreted according to procedures that are described in detail in section 4.8. Data processing was carried out by analysing three sources as depicted in Figure 31. First, the list of challenges obtained from the literature (section 2.3) was categorised according to the conceptual framework. Next,

the interview findings were combined into a single list of challenges of the same format by aggregating the interview data. The individual statements of each interviewee were grouped into more general and universal formulations. In this way, a list of challenges was generated as a result of the processing of the interview data and presented in section 5.3.1.

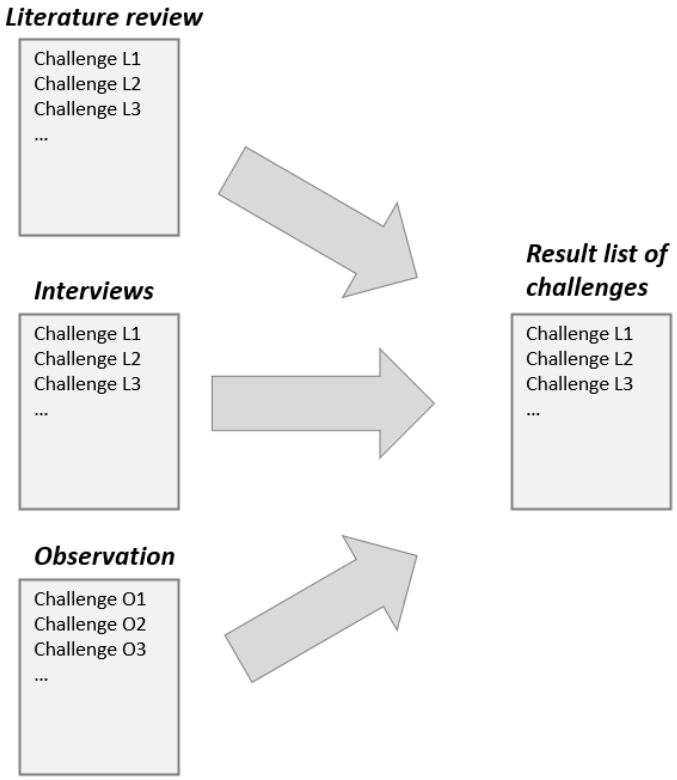


Figure 31. Data analysis using the principle of triangulation to identify challenges

The challenges identified from the analysis of publications, interviews and observations were then combined. As in the interview data, in the process of merging, challenges from the three sources that are similar in meaning are aggregated and re-formulated. For each item in the list, the 'Mentioned by' column lists the occurrences of its mention by respondents, literature or observation. The number and weight of mentions is used to calculate the score. This parameter allows the assessment of the challenges in order to prioritise the elements in the list and eliminate those of little importance. The

threshold for removing irrelevant records was chosen by the researcher during data processing and is equal to 3. This value allows the removal of challenges described by only one interviewee or a specific problem of a single company, those elements that do not represent knowledge about the challenges that characterise the process of implementing a chatbot in different organisations.

The results contain items from three sources, grouped by challenge Category and ranked by Score value and presented as three separate tables according to the category parameter (Table 11, Table 12, Table 13). By answering the question "what are the main challenges which companies face when implementing chatbot projects?" these three lists address the RO1. Thus, as a result of this qualitative study carried out using two data collection techniques (interview and observation) and an extensive analysis of publications, the challenges that face companies when implementing and deploying chatbots have been identified. The Score parameter, which reflects the result of a quantitative assessment of the results obtained, makes it possible to prioritise the challenges, suggesting the most critical of them, so that, using the results of this study, chatbot implementation teams can better assess project risks and plan appropriate activities.

Table 11. List of technology related challenges which companies face when implementing chatbot projects

No.	Main challenges which companies face when implementing chatbot projects	Mentioned by	Category	Score
Challenge 1	Complexity and amount of system integration work.	Interviewees 1, 3, 4, 5, 6, 8, 9, 10, 12, 13, 15 Literature	Technology	23
Challenge 2	Difficulty in finding the best product and vendor which can solve your problem and will offer its service for a long time	Interviewees 1, 6, 14, 15 Literature Observation	Technology	15
Challenge 3	Overall complexity of chatbot projects and necessity to deal with many software systems and IT technologies	Interviewees 4, 5, 7, 8 Literature Observation	Technology	13
Challenge 4	Chatbots require much calculation resources. Many companies are not ready to purchase required hardware	Interviewees 2, 4, 7 Literature	Technology	10
Challenge 5	Few companies are able to collect, analyse and use their internal data to develop appropriate chatbot behaviour	Interviewees 2, 7, 11	Technology	9
Challenge 6	The complexity of regulation and information security tasks	Interviewees 3, 10, 12 Literature	Technology	9
Challenge 7	Current chatbot technologies are complex but not yet perfect and bots often fail to process users' requests properly	Interviewee 7 Literature Observation	Technology	9
Challenge 8	The license and support costs of a chatbot systems from leading vendors is too high, what forces teams to create their own solution	Interviewee 11 Literature	Technology	6

Table 12. List of organisation related challenges which companies face when implementing chatbot projects

No.	Main challenges which companies face when implementing chatbot projects	Mentioned by	Category	Score
Challenge 9	Difficulty in formulating project objectives, success criteria and measuring KPIs	Interviewees 2, 3, 4, 6, 7, 8, 12, 13, 14 Observation	Organisation	24
Challenge 10	Lack of in-house chatbot expertise and limited availability of relevant specialists in the market	Interviewees 4, 5, 6, 9, 10, 11, 13, 15 Literature Observation	Organisation	21
Challenge 11	Top managers are often underestimate chatbot integration projects complexity and costs and not ready to invest significant budget in a new technology adoption	Interviewees 1, 2, 4, 6, 7, 14 Observation	Organisation	17
Challenge 12	Planning and managing chatbot projects is challenging due to their unpredictability and high uncertainty	Interviewees 2, 3, 4, 7, 14	Organisation	11
Challenge 13	Low quality of integration services provided by vendors and IT integrators	Interviewees 1, 2, 3, 4 Observation	Organisation	10

Table 13. List of user needs and chatbot performance related challenges which companies face when implementing chatbot projects

No.	Main challenges which companies face when implementing chatbot projects	Mentioned by	Category	Score
Challenge 14	User scepticism about the capabilities of chatbots and unwillingness to interact with them	Interviewees 1, 3, 4, 7, 8, 9, 10, 11, 12, 14 Literature Observation	User Needs	27
Challenge 15	User behaviour in chats is very different from other channels like phone, website, mobile app. High-quality UX design skills and user training are required.	Interviewees 8, 9, 11, 14, 15	User Needs	11
Challenge 16	The scenario-based approach for creating bots prevails, but limits their capabilities	Interviewees 2, 6, 11	User Needs	8
Challenge 17	Difficulty in creating a chatbot which solves the company's problem and provides users with an excellent service the same time.	Interviewees 1, 10	User Needs	4

6.3 Critical success factors for chatbot implementation

This section presents the results of the analysis of the research data collected during the study. The analysis was carried out according to the techniques and procedures described in section 4.7, with the aim of identifying critical success factors that significantly influence the success of chatbot integration and help in the strategic planning of chatbot implementation projects. Similar to the way the list of challenges was obtained (section 6.2), the process of identifying CSFs is based on the principle of triangulation, i.e. using three sources of data to answer the question posed by the researcher. The critical success factors identified in the analysis of scientific publications and studies of technology companies are first described in section 2.4 and then listed in Table 2 according to the conceptual framework. Similarly, the results of the interviews (Table 8) and observations (Table 10) are presented. At the analysis step,

three lists presented in tabular form are combined into a single list, which is the result. This process is shown schematically in Figure 32.

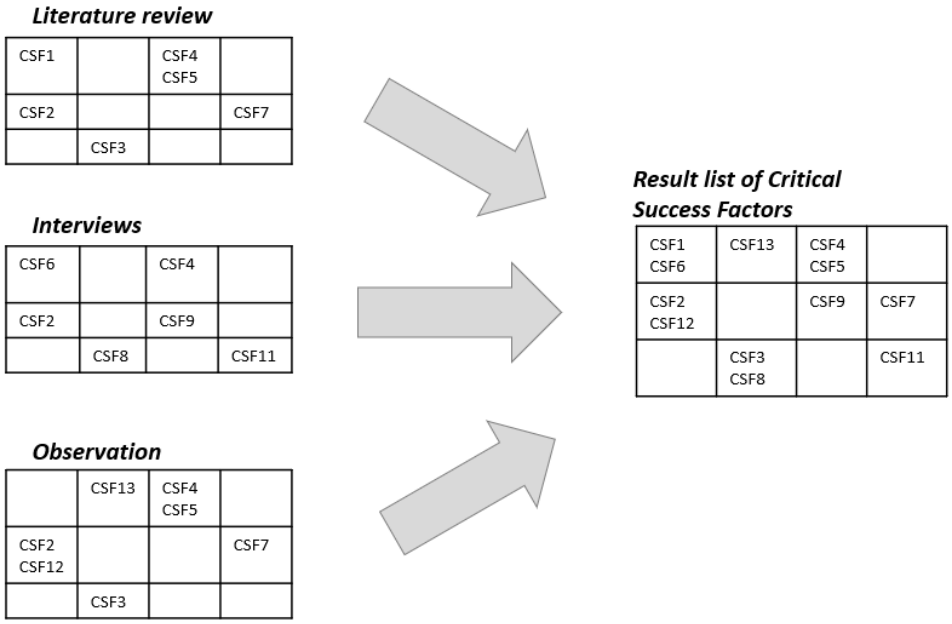


Figure 32. Data analysis using the principle of triangulation to identify CSFs

The process of merging CSFs from three sources was carried out by finding identical and similar formulations, and by aggregating similar or complementary ideas into more general and universal statements to ensure that one CSF is not being discussed in multiple ways. After the creation of a single list, the score value was calculated for each CFS according to the algorithm described in section 4.7. This parameter is related to the number of times the item was mentioned by the respondents, its persistence in the literature review and the observations. Items that received a minimum score of 3 and below are excluded from the result, as in most cases they represent individual judgements of single respondents that have not been confirmed in other sources.

The result of the analysis and data processing is the list of CSFs depicted in Figure 33. The result of a qualitative study based on extensive literature review and using two data collection techniques, interviews and observation, this list addresses RO2. The

identified CSFs allow implementation teams to strategically plan and execute chatbot projects and increase the chances of a successful chatbot launch. The presentation of the CSFs in a table, using the structure of the conceptual framework, improves the way how to use the content in practice and to take into account the given factors at each phase of the project, from the Conception to the Operation.

	Conception	Definition	Execution	Operation
Technology	Identify and choose the most suitable technology and vendor which meet your business requirements. **(Score=26)** Explore vendor options and external service availability in your field and locality. **(Score=24)** Choose a platform that can provide detailed reports about your chatbot performance. **(Score=19)** Analyse build and buy approaches to define your strategy. **(Score=17)** Analyse API of the selected platform and how to integrate it with the company's IS. **(Score=10)** Study project portfolio of vendor candidates, request recommendations from their clients. **(Score=9)** The selected platform should have a powerful dialog editor. **(Score=6)**	Invest in analysis and planning of system integration and data migration tasks. **(Score=23)** Define scalability requirements and realistically estimate the required hardware. **(Score=13)** Obtain necessary access to IS and solve information security issues. **(Score=13)** Strategically plan the compatibility of the bot platform with the company's internal IT systems. **(Score=12)** Make sure you know exactly how you can develop the bot on your own or change the integrator company, if necessary. **(Score=8)** Formulate comprehensive functional requirements that determine the result. **(Score=5)**	Create dashboard for tracking chatbot behavioural metrics and success indicators after the launch. **(Score=11)** Perform load testing, plan and prepare infrastructure for high load. **(Score=9)** Prepare and use development, testing and production environment. **(Score=9)** Use SLAs (service level agreements) to set performance requirements for involved IS. **(Score=6)**	Monitor a chatbot availability and usage. **(Score=19)** Continuously improve the chatbot by applying recent AI technologies, updating language models, and installing the platform updates. **(Score=14)**
Organisation	Identify your aim, key success indicators and associated improvement metrics. **(Score=24)** Identify use cases and assess suitability of using a conversational UI. **(Score=19)** Find an expert to join your team. **(Score=10)** Prepare the ground for agile working. **(Score=9)**	Form a product team on the company's side which includes a product owner, analyst or dialog designer, data scientist, UX-designer, technical leader. **(Score=23)** Use the MVP method and an iterative approach. **(Score=18)** Find a responsible project leader from the business team who has the necessary expertise. **(Score=9)** Involve top management into the process. **(Score=6)** Communicate your aim to your team, contractors, and top management. **(Score=5)**	Apply an agile iterative approach and MVP method. **(Score=23)** Define the chatbot maintenance team, their responsibilities and train the key users. **(Score=10)** Test your bot internally with your team, and with business experts in the company. **(Score=7)** Pay attention to project control, reporting and communication with the contractor. **(Score=4)**	Collect dialog data and invest time and resources in bot training. **(Score=13)** Develop the chatbot expertise and grow your team in-house. **(Score=9)** Continue to use the agile development approach. Turn it into a routine. **(Score=9)** Make sure that the chatbot systems are accepted by IT support technical specialists. **(Score=7)** Advertise bot features and share success stories within your company. **(Score=5)**
User Needs	Focus on one business objective. **(Score=20)** Analyse alternatives to the chatbot service. Specify why the chatbot is the best way to solve your problem. **(Score=13)** Make sure the chatbot is not only good for the company but designed to make the customer's life better. **(Score=10)** Make sure the chatbot is the most convenient way for users to solve their problems. **(Score=5)**	Focus on chatbot productivity. The ease, speed, and convenience of using chatbots are vital. **(Score=16)** Use CJM and Jobs-To-Be-Done methods to capture user experience and specify chatbot requirements. **(Score=16)** Choose the "easy-to-develop" functionality. Publish limited but well developed functionality. **(Score=14)** Design a chatbot personality which fits your brand communication style. **(Score=13)** Focus on intuitive and simple UX. **(Score=9)** Apply blended communication approach. **(Score=9)** Plan methods and tools for collecting user feedback. **(Score=8)**	Test every product iteration on a small pilot group of real customers using real data. **(Score=23)** Test UX and employ measurement tools which your platform offers. **(Score=13)** Determine your bot personality which fits your brand communication style. **(Score=10)**	Monitor chatbot performance and identify which requests were not processed properly. **(Score=23)** Study your user needs by collecting feedback and plan new features accordingly. **(Score=20)** Monitor chatbot behavioural metrics and success indicators. Ensure that the chatbot achieves its objectives. **(Score=20)** Advertise bot capabilities to its users and create respective promotion plan. **(Score=15)** Collect qualitative data about chatbot performance to improve functionality. **(Score=12)**

Figure 33. Critical success factors for chatbot implementation

6.4 New model formulation

The results of a qualitative study using a case study strategy and two data collection techniques, interviews and observations, are presented in the previous sections 6.2 and 6.3. Answers to questions related to RO1 and RO2 provide the necessary basis for further discussion and bring the researcher closer to achieving the research aim - formulating a new operating model designed to make chatbot implementation projects more manageable and successful.

The conceptual framework described in chapter 3 helped to link several theories and ideas. It played the key role during the practical and analytical phases of the study helping the research to shape the data collection and processing activities. The Critical Success Factors method is widely used to identify the most important components of success and to provide a strategic approach to planning various transition and development activities in companies. The use of this approach in the study provided a reliable way of identifying the components of success needed to build the new operating model. The conceptual framework structure organises the identified critical success factors and allows the elements of overall success to be considered in the context of three categories (Technology, Organisation and User Needs) and each of the four phases typical for most projects (Conception, Definition, Execution, Operation). Thus, the result illustrated in Figure 33 can, to a certain extent, be used as an operational model that can support the chatbot implementation process and deliver the expected chatbot project outcomes. At the same time, in the process of conducting the research, analysing and processing the research findings, the researcher identified a number of patterns and came up with ideas that can be used in the development of the provisional model depicted in Figure 33. A number of extensions which transform the current result into a more organised and dynamic operating model with a better compact presentation are proposed in the later part of this chapter.

Analysing the provisional model shown in Figure 33 and critically evaluating the result, it is easy to see that this is a rather large amount of information, which is difficult to

work with in practice. The total number of CSFs is 59, which far exceeds the typical number of 5-8 items usually listed by Rockart (1979), the author of the CSF method, in his examples. As mentioned in section 2.4.1, the use of more CSFs is often criticised, but in many cases, it is well justified. At the same time, researchers use different approaches to organise the identified CSFs into different hierarchical structures and groups. A similar approach is also appropriate in this study, since a significant reduction in the number of CSFs may lead to the loss of valuable information identified during the study. Therefore, using grouping and aggregation, 5-8 main factors can be identified, whilst keeping longer lists of secondary elements.

During the interviews and subsequent data processing, the researcher identified cases where certain CSFs could be assigned to several phases of the project or several categories. Many interviewees found it difficult to relate some of their ideas to specific cells of the conceptual framework, and formulated the factors as more general rules to be followed by teams as a whole. This is illustrated schematically in Figure 34 (transition A). For example, CSF37 - 'Focus on chatbot productivity' is listed in the definition phase of the User Needs category, although this factor is more global in nature. It is not really an expression of a specific set of actions that are important for success in the Definition phase, but rather a general rule. Following the recommendation to focus on chatbot productivity can be justified in almost any action to solve a variety of problems, such as choosing a technology and platform, setting goals, formulating technical requirements, defining functionality, planning the development backlog, testing, etc. By focusing on the need to create a fast and convenient service throughout the project, teams greatly increase the chances of creating a successful service that will attract and satisfy.

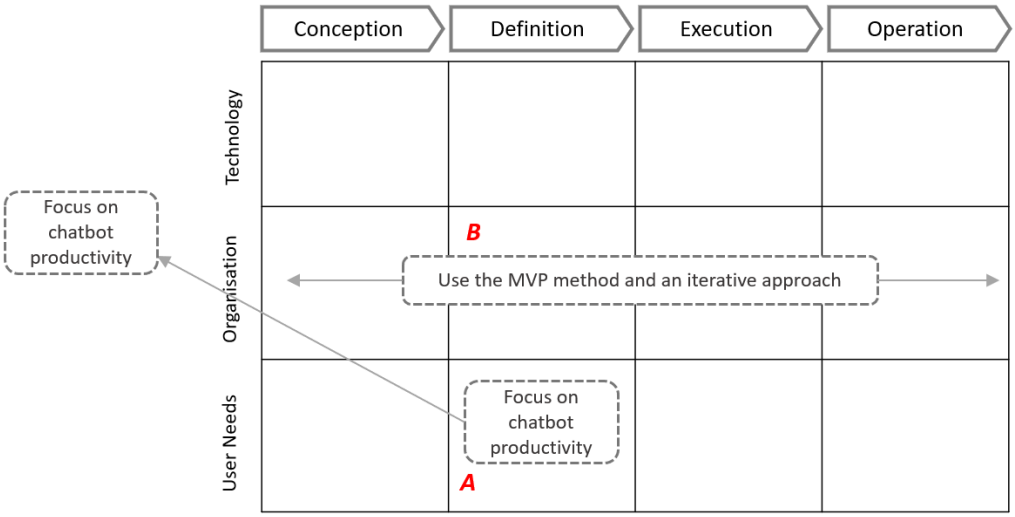


Figure 34. Generalisation of CSFs

The next example, depicted in Figure 34 (transition B), shows the presence of CSFs that may be relevant to a particular category, but are valid for all phases of the project. However, at each phase, this CSF is characterised by specific actions that are relevant to that particular phase. For example, CSF27 - "Use the MVP method and iterative approach" is assigned to the Definition phase, but there are other entries associated with it in all the other phases:

Conception. CSF13 - "Prepare the ground for agile working". According to this recommendation, the application of the MVP method and agile project management methodologies in subsequent phases is only possible if the necessary preparatory work has been carried out. In particular, the company and the integrator must agree on the chosen project management methodology, budgeting and planning approach. The ability to use time and materials, in addition to a fixed price, time and materials type of contract can provide teams with the tools they need to apply agile development methodologies.

Definition. CSF27 - "Use the MVP method for planning". At this phase the application of the MVP method determines the further course of the project. Planning is carried out to

determine the functionality of the first version of the product, the constraints, and the total scope of work. Applying the method at this phase makes it possible to take advantage of its benefits, create and launch a working version of the service as soon as possible, and have the opportunity to test it on pilot users.

Execution. CSF48 - "Use the agile development approach". Throughout the development and implementation of a bot, it is important to maintain the chosen approach and avoid unreasonable scope creep. The use of agile development methods such as Scrum will help the team to focus on building a working service rather than following formal documentation and will make it possible to respond more quickly to unexpected changes.

Operation. SCF65 - "Continue to use the agile development approach. Turn it into a routine". After a successful project launch, service development continues. Tracked success metrics, collected user feedback, and team insights are the sources for further improvements. It is recommended to continue using the MVP methodology, releasing more advanced versions of the product in short iterations, and using the agile approach to development as in the Execution phase.

The above example shows that the use of MVP and agile methodologies is a recommendation that is relevant throughout the project. As the critical success factor is formulated in a more general way, it no longer corresponds to a specific cell in the two-dimensional matrix and can be taken out of it. At the same time, at each phase in the Organisation line, following this recommendation can lead to specific actions that correspond to the current phase of the project. In this way, these entities can be linked hierarchically - the CSF, which exists in the context of the whole project, and the associated activities, which are derivatives of this CSF and are recommended for execution according to the project phase. This dependency is shown schematically in Figure 35.

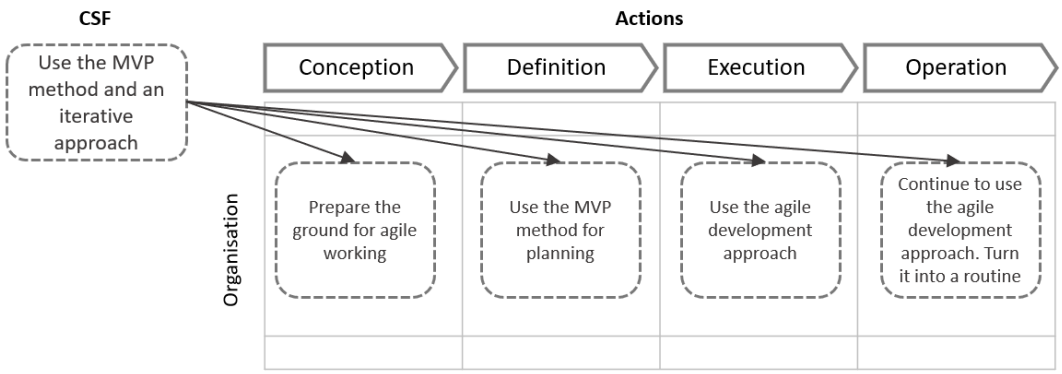


Figure 35. Link formation between CSFs and derivative actions

The approaches described above can be applied to varying degrees to many of the 59 CSFs presented in the provisional model. In addition, in order to reduce the number of CSFs, it makes sense to further consolidate similar or complementary formulations into more general statements. The process of aggregating model elements will result in a reduced list of more general CSFs that fall outside the scope of the tabular structure of the provisional model. What remains in the tabular part of the model are elements that are more local tasks or actions. They are derivatives of the CSFs and reflect the key issues that teams need to address within the specified project stages. Actions remain valuable to the model as a tool to move from the strategic level to project execution.

Next, using the provisional model and applying the CSF generalisation approaches described above and illustrated in Figure 34, the researcher conducts further data analysis. Each of the CSFs in the model is analysed according to the following criteria:

- The CSF is independent or largely independent of the stage of the project, but rather an important ingredient for success that teams should consider throughout the project.
- There are similar CSFs at several stages of the project, which complement each other. They are rather derivatives of a more general rule.

As a result, 7 CSFs are obtained that best meet the given generalisation criteria:

1. The chosen platform and technology should best suit the current needs. The choice of platform largely determines the capabilities and limitations of the resulting chatbot behaviour. As mentioned in Section 2.2.3, the chatbot industry is relatively new, highly fragmented, and represented by a large number of offered platforms from both global and niche players. There is no perfect solution, so choosing the most appropriate platform is a challenge. Rather than simply choosing the platform with the most features, teams need to formulate their goals, develop technical requirements and identify constraints, and list the key platform features needed to implement the future service. In other words, the platform should best represent the features that are specifically needed for the project. With the highest score=27, this CSF is also reflected in several Actions in the tabular part of the model:

- Choose a platform that can provide detailed reports about your chatbot performance.
- Analyse build and buy approaches to define your strategy.
- Analyse the API(s) of the selected platform and how to integrate it with the company IS.
- Ensure the selected platform has a powerful dialog editor.
- Strategically plan the compatibility of the bot platform with the company's internal IT systems.
- Formulate comprehensive functional requirements that determine the result.
- Continuously improve the chatbot by applying recent AI technologies, updating language models, and installing the platform updates.

2. System integration and data migration tasks are in focus. This study shows that the scope, importance and complexity of the IS integration tasks that need to be solved when creating and launching a chatbot are often underestimated. At the same time, these tasks are critical to the implementation of a chatbot, as the chatbot uses information from multiple enterprise data sources to provide its service. The complexity of integration tasks is usually associated with differences in the technologies used and

difficulties in managing change of company IS. Different systems may have different owners, development teams, priorities, management and planning approaches. The ability of chatbot project teams to anticipate these difficulties and manage this complexity throughout the project is a critical success factor represented by the following related activities:

- Analyse the API(s) of the selected platform and how to integrate it with the company IS.
- Invest in analysis and planning of system integration and data migration tasks.
- Obtain necessary access to IS and solve information security issues.
- Use SLAs (service level agreements) to set performance requirements for involved IS.

3. Focus on one business objective. This CSF received one of the highest scores and the need to focus on a well-defined business objective is strategic, global and relevant throughout the project. Following this recommendation can be expressed through the implementation of specific actions indicated in the preliminary model. For example:

- Identify your aim, key success indicators and associated improvement metrics.
- Monitor chatbot behavioural metrics and success indicators. Ensure that the chatbot achieves its objectives.

At the same time, the impact of this factor is also reflected in a more conscious approach to the implementation of other tasks in the project. A less obvious connection can be made with activities related to choosing a platform, writing functional requirements, applying the MVP method and formulating the scope of the project. In all of these situations, the ability to stay focused is an important part of keeping teams on track and achieving their goals.

4. Chatbot expert is in your team. Given the complexity of chatbot implementation projects, the complex vendor landscape, and the combination of multiple technologies used, a team needs expertise that is often lacking to be successful. An expert is needed

to solve many problems related to both organisational and technical issues. This research shows that companies approach this challenge in different ways. Some hire external consultants, while others focus on developing the necessary expertise within the company. At the same time, different specialists may be involved in the project depending on the category of task and the phase of the project, as one person may not always be an expert in all aspects related to the implementation of chatbots.

5. The MVP method and an iterative approach are used. As described earlier in this section and illustrated schematically in Figure 35, this CSF integrates a number of approaches to planning, implementing and evolving the project. The use of agile methodologies, an iterative approach, the study of user needs, the adjustment of the service behaviour based on the results of pilot tests - all this allows the chatbot team to gain the necessary flexibility and to direct their actions to create a convenient service for the customer under conditions of high uncertainty.

6. Chatbot is the best way to solve users' problem. In most cases, chatbots are created by companies as assistants to replace a human or to improve the user experience when interacting with other digital services, such as a mobile application or website. When alternatives are available, the chatbot should offer some benefits to the user that help solve the problem more efficiently. For example, communicating in human language can often be more convenient than using a graphical screen interface, and getting an immediate answer from a bot to a simple question is more useful than waiting for a better answer from a company representative. If a bot does not offer these benefits, it is unlikely to be used regularly. This CSF is most relevant in the early stages of planning, when the goal of the project and the functionality of the bot are being formulated. However, it remains relevant in later stages of the project lifecycle. Actions related to this factor:

- Identify use cases and assess suitability of using a conversational UI.
- Analyse alternatives to the chatbot service. Specify why the chatbot is the best way to solve your problem.

- Make sure the chatbot is not only good for the company but designed to make the customer's life better.
- Test every product iteration on a small pilot group of real customers using real data.
- Study your user needs by collecting feedback and plan new features accordingly.

7. Chatbot productivity is the top priority. This CSF complements the previous one in that it also aims to create a service that effectively solves users' problems. It combines a number of key actions to ensure speed, reliability, quality of answers and a superior user experience:

- Use CJM and Jobs-To-Be-Done methods to capture user experience and specify chatbot requirements.
- Design an intuitive and simple UX.
- Apply blended communication approach.
- Create dashboard for tracking chatbot behavioural metrics and success indicators after the launch.
- Perform load testing, plan and prepare your systems for high load.
- Test UX and employ measurement tools which your platform offers.
- Design a chatbot personality which fits your brand communication style.
- Monitor chatbot performance and identify which requests were not processed properly.
- Monitor chatbot behavioural metrics and success indicators. Ensure that the chatbot achieves its objectives.

The obtained aggregated transformations of the preliminary model are visually presented in Figure 36. The seven **CSFs** are outside the table, organised horizontally, and are more general entities from which the **Key Actions** follow, presented in the two-level structure used previously. This diagram also uses colour coding to indicate which CSFs belong to the three categories.

CSFs

The chosen platform and technology best suit the current needs	System integration and data migration tasks are in focus	Focus on one business objective	Chatbot expert is in your team	The MVP method and an iterative approach are used	Chatbot is the best way to solve users problem	Chatbot productivity is the top priority

Key Actions

	Conception	Definition	Execution	Operation
Technology	Identify and choose the most suitable technology and vendor which meet your business requirements.	Invest in analysis and planning of system integration and data migration tasks.	Create dashboard for tracking chatbot behavioural metrics and success indicators after the launch.	Monitor a chatbot availability and usage.
	Explore vendor options and external service availability in your field and locality.	Define scalability requirements and realistically estimate the required hardware.	Perform load testing, plan and prepare your systems for high load.	Continuously improve the chatbot by applying recent AI technologies, updating language models, and installing the platform updates.
	Choose a platform with powerful reporting tools and dialog editor.	Obtain necessary access to IS and solve information security issues.	Prepare and use development, testing and production environment.	
	Analyse build and buy approaches to define your strategy.	Strategically plan the compatibility of the bot platform with the company's internal IT systems.	Use SLAs (service level agreements) to set performance requirements for involved IS.	
	Analyse API of the selected platform and how to integrate it with the company's IS.	Make sure you know exactly how you can develop the bot on your own or change the integrator company, if necessary.		
	Study project portfolio of vendor candidates, request recommendations from their clients.	Formulate comprehensive functional requirements that determine the result.		
Organisation	Identify your aim, key success indicators and associated improvement metrics.	Form a product team on the company's side which includes a product owner, analyst or dialog designer, data scientist, UX-designer, technical leader.	Use the agile development approach	Collect dialog data and invest time and resources in bot training.
	Identify use cases and assess suitability of using a conversational UI.	Use the MVP method for planning	Define the chatbot maintenance team, their responsibilities and train the key users.	Develop the chatbot expertise and grow your team in-house.
	Find an expert to join your team.	Find a responsible project leader from the business team who has the necessary expertise.	Test your bot internally with your team, and with business experts in the company.	Continue to use the agile development approach. Turn it into a routine.
	Prepare the ground for agile working.	Involve top management into the process.	Pay attention to project control, reporting and communication with the contractor.	Make sure that the chatbot systems are accepted by IT support technical specialists.
		Communicate your aim to your team, contractors, and top management.		Advertise bot features and share success stories within your company.
User needs	Analyse alternatives to the chatbot service. Specify why the chatbot is the best way to solve your problem.	Use CJM and Jobs-To-Be-Done methods to capture user experience and specify chatbot requirements.	Test every product iteration on a small pilot group of real customers using real data.	Monitor chatbot performance and identify which requests were not processed properly.
	Make sure the chatbot is not only good for the company but designed to make the customer's life better.	Choose the "easy-to-develop" functionality. Plan to publish limited but well developed functionality.	Test UX and employ measurement tools which your platform offers.	Study your user needs by collecting feedback and plan new features accordingly.
		Design an intuitive and simple UX.	Design a chatbot personality which fits your brand communication style.	Monitor chatbot behavioural metrics and success indicators. Ensure that the chatbot achieves its objectives.
		Apply blended communication approach.		Advertise bot capabilities to its users and create respective promotion plan.
		Plan methods and tools for collecting user feedback.		Collect qualitative data about chatbot performance to improve functionality.

Figure 36. New model development through aggregation of CSFs and definition of key actions

Despite the significant improvement of this scheme through the organisation of the entities into top-level CSFs and the key actions derived from them, this model is incomplete. In the resulting version, there is a noticeable lack of a strategic level, which is expressed by the objectives of the company and the project. The original CSFs method, as well as various forms of its development, is used to strategically plan changes in a company's IS. In particular, Earl's (1989) top-down approach, described in section 2.5.2, uses a three-level structure in which the CSFs are the element that links

the company's strategic goals to tactical planning activities. A similar construct is presented by Bullen et al. (1981), in which CSFs link an objective to key activities. This relationship is shown schematically in Figure 37.

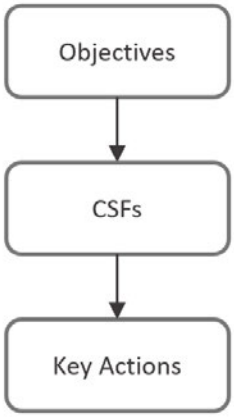


Figure 37. Planning procedure with CSFs

The use of this design in this study helps to establish the strategic level on the diagram, linking project objectives with CSFs and key actions. This gives the model the characteristics of an operational model, making it more applicable to project planning and control activities in chatbot integration projects. The creation of the top strategic level can be achieved by moving the corresponding CSF - "Focus on one business objective" - to a higher level and adjusting its wording. In project management, the key metrics that measure the achievement of the goal and the success of the project are usually associated with the project goal. This is reflected in the model, which assumes that the activities to define the project aim, the success indicators and the corresponding metrics are carried out in the Definition phase and fall under the Organisation category. The updated construct resulting from the creation of the new Objectives layer is shown in Figure 38.

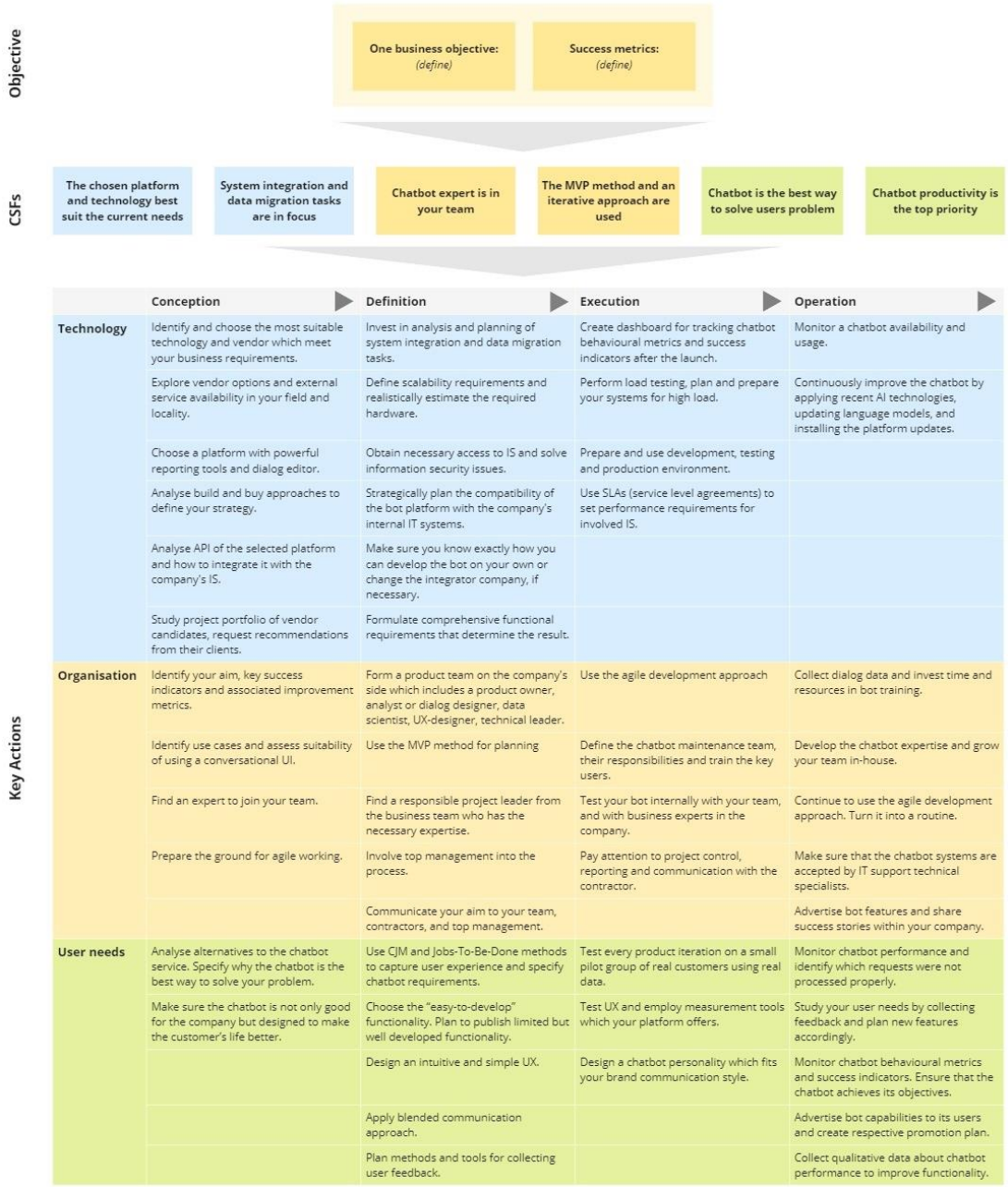


Figure 38. New chatbot implementation model

After a series of transformations of the provisional model, described in this section, an improved version of the model was formulated, with characteristics that make it an application tool that can be used to successfully plan chatbot implementation projects. The three-layer structure provides a step-by-step transition from setting objectives to forming the main tasks that are critical to the success of the project. The top layer of

objectives is represented by elements that require the definition of a key objective, as well as quantitative indicators that measure objective achievement and success. This is followed by the CSF layer, represented by the six most important factors influencing the project.

This list, identified as a result of this study, is typical of a variety of chatbot implementation projects. The CSFs are formulated as rules and guidelines, the implementation of which can underpin the success of the project. Key Actions, which are located at the bottom level of the model, are derived from the CSFs. In this way, a transition is made from abstract and general rules (CSFs) to tactical tasks and actions that ensure the implementation of these rules. Organised according to the four typical phases of a project and divided into three categories, the Key Actions can be used by teams as a tool for drawing up a detailed project plan. Depending on the characteristics of a specific project, the list of actions or tasks at the lower level can be supplemented and the suggested formulations can be modified in order to adapt the content of the model to a specific project. It is advisable to carry out such adaptation of tasks while maintaining the link with the two upper levels. In other words, changes should be made in such a way that the actions best meet the CSFs in the context of the project.

6.5 Model validation

Following the approach described in section 4.8, the researcher conducted validation procedures to confirm the research findings. The validation process involved five experts, including two participants who were previously interviewed during the research and three persons who were not previously involved in the case study. The validation process consisted of three steps. First, the experts were provided with a new model for chatbot implementation, along with a detailed description. Next, a discussion of the model took place between the researcher and the experts, focusing on the model's structure, content, and application recommendations. Finally, the experts independently completed a questionnaire evaluating four aspects of the model. This

process reviewed and confirmed the research findings and provided valuable recommendations for further improvement.

Table 14 shows respondents' answers to the first question. In assessing the structure of the model, respondents indicated that it is understandable and does not require additional explanation, or possibly only clarification of individual elements. Respondent 2 argued that although the structure is generally clear, the relationship between the layers is not obvious in terms of project phases. A slight misunderstanding is caused by the presence of phases in the Key Actions layer and their absence in the CSFs layer. Respondent 3 added that the model could be more explicit in defining the nuances of each element and stated that it is not clear how the dependencies between elements evolve over time.

Table 14. Expert evaluation of the model structure

Question 1. Evaluate the structure of the model. How clear are the elements represented in the model and the relationships between them?					
	Respondent 1	**Respondent 2**	**Respondent 3**	**Respondent 4**	**Respondent 5**
The structure of the model is very clear and does not require additional explanation	O				O
The structure of the model is generally clear, but some elements may raise questions		O	O	O	
The structure of the model is fairly clear, but additional explanation is needed to use it					
Many elements of the model raise questions					
The structure of the model is unclear					

The assessment of the model in terms of the completeness of the list of CSFs and the clarity of their wording was high (Table 15), but all the respondents nevertheless suggested some minor improvements. Respondent 1 stated that the point "chatbot is

the best way to solve the user's problem" needs to be clarified. In some cases, a chatbot can only be an additional channel of communication with a customer, i.e., it does not solve the customer's problem directly, but only helps to find the right information on the website or to obtain it from another channel. Respondent 2 agreed that choosing the right platform is a critical step. He pointed out that although the approach to platform selection and the selection criteria are outside the scope of this study, this information can be of great help to managers. He also noted that platform selection criteria can change at different stages of a project. Respondent 3 stated that “the model's CSFs provide a comprehensive foundation for successful chatbot implementation” but their wording is sometimes too short and technical for some its potential users. Some CFSs could be improved by being worded in a more precise or unambiguous way to better express their meaning or relevance. Respondents 4 and 5 both noted that while all CSFs are understandable and relevant, they are general and universal. However, different types of chatbot projects and various industries may have their own characteristics that are not reflected in this model.

Table 15. Expert evaluation of the completeness of the CSFs and the accuracy of the wording

Question 2. How do you evaluate the completeness of the critical success factors (CSFs) of the model, as well as the accuracy of the wording in terms of a typical chatbot implementation project?					
	Respondent 1	**Respondent 2**	**Respondent 3**	**Respondent 4**	**Respondent 5**
The list of CSFs is complete, and the wording is accurate					
The list of CSFs is quite complete, but its wording or individual elements may be slightly adjusted.	0	0	0		0
The list of CSFs makes sense, but its wording or individual elements may need to be adjusted				0	
The list of CSFs and its wording poorly correspond to the reality of projects for the implementation of chatbots					
The list of CSFs and their wording are irrelevant					

The Key Actions layer of the model was highly rated by all respondents (Table 16). 4 out of 5 respondents noted that the structure of the layer is clear, and the wording of the proposed actions are fully in-line with a typical chatbot implementation project, which follows from the respondents' experience. However, some respondents suggested minor improvements. Respondent 2 argued that the model would benefit from indicating which actions should be undertaken regularly and which have to be completed once per project. Respondent 3 added that the terminology of the phrases used could be slightly improved. A clearer, simpler way of writing some of the key actions would make the model even more understandable and accessible to a wide range of practitioners.

Table 16. Expert evaluation of the completeness of the Key Actions and the accuracy of their wording

Question 3. How do you evaluate the completeness of the Key Actions of the model, as well as the accuracy of the wording in terms of a typical chatbot implementation project?					
	Respondent 1	**Respondent 2**	**Respondent 3**	**Respondent 4**	**Respondent 5**
The list of Key actions is complete, and the wording is accurate	O	O		O	O
The list of Key Actions is quite complete, but its wording or individual elements may be slightly adjusted.			O		
The list of Key Actions makes sense, but its wording or individual elements may need to be adjusted					
The list of Key Actions and its wording poorly correspond to the reality of projects for the implementation of chatbots					
The list of Key Actions and their wording are irrelevant					

Question 4 is the key question that sums up the validation (Table 17). Respondents directly assed if the model can aid the manageability of chatbot projects and increases their chances of success. 4 out of 5 respondents strongly agreed that the new model can make chatbot projects more manageable and increase their chances of success. Respondents with extensive experience in managing a variety of IT projects (including chatbot projects) noted that the strengths of the model are its ability to provide a structured approach to the project, as well as a set of practical recommendations to help manage uncertainty and anticipate risks. Respondent 2 noted the advantages of this model over other more generic models and principles used to create digital products. He also noted that the model may be most effective for teams implementing a chatbot for the first time, or for teams with little implementation experience. At the same time, the model can be used not only for planning and controlling new projects, but also as a tool for evaluating and validating chatbots that have already been created,

for example as a checklist or evaluation matrix for a project audit. Respondent 3 supported the others by stating that the model is promising and has high potential in terms of its ability to improve the manageability of chatbot implementation projects. However, in his assessment of the model, he took a neutral position. He pointed out that the model has a theoretical basis and that the lack of real practical examples of the model's application or studies confirming its effectiveness does not allow him to fully agree with the proposed statement.

Table 17. Expert evaluation of the new model

Question 4. Do you agree or disagree with the following statement: The new model for chatbot implementation can aid the manageability of chatbot projects and increases their chances of success?					
	Respondent 1	**Respondent 2**	**Respondent 3**	**Respondent 4**	**Respondent 5**
Strongly agree	O	O		O	O
Agree					
Neutral			O		
Disagree					
Strongly disagree					

Summarising the results of the validation survey, the general conclusion is that the model is highly valued by the respondents. The answer to Question 4 assesses the validity of the study as a whole and indicates that the research aim has been achieved. Most of the comments are valuable recommendations which, if implemented, can help to improve the proposed model. These recommendations can be divided into two groups. The first group are remarks and suggestions of a design nature. Their implementation does not require additional research or changes to the current conclusions, which are based on the research findings. These are changes that improve

the applicability of the model through a more intuitive presentation of the model. In response, the following amendments to the model have been introduced:

- For each CSF, a more detailed description has been added, so that its meaning is precise and understandable to a wider range of non-specialists.
- "Key Actions" has been changed to "Recommended Key Actions". This emphasises that the model is advisory in nature, that the list of actions is neither mandatory nor exhaustive, and that in practice it is recommended to modify it according to the specific context of a project.
- The term “CSF” has been stated in full, as not all readers will understand it without further explanation.
- Some of the key actions have been rephrased to make them simpler and more understandable for different users of the model, including those without extensive knowledge of AI and chatbots.

The updated model, modified in accordance with these recommendations, is presented in section 7.2. The second group of suggestions relates to a more fundamental part of this study, and therefore they cannot be implemented within the scope of the analysis and interpretation of the research findings. For example, respondents highlighted the need for a method or procedure for selecting a platform and the need to conduct a study to test the effectiveness of the model in practical implementations. All these comments are reasonable, justified and logical suggestions for the development of the model, but they are all beyond the scope of this study. However, they are all reflected in section 7.4 as suggested topics for further research.

6.6 Model application and guidance

The new chatbot implementation model is designed for use in chatbot implementation projects at large and medium size organisations across a range of industries. It provides business leaders and project teams with a structured approach to planning key project tasks, reducing risk and increasing the chances of successful deployment and

maintenance. Under the conditions of high uncertainty inherent in most AI implementation projects, and also given the lack of experience of teams in implementing similar services, the model serves as a guide for developing an action plan that focuses on the most important aspects at each stage of the project.

This study aims to find and formulate a new model that can be applied to a wide range of chatbot projects, regardless of the technology used, the problem solved, the region and the industry. However, the model has a number of characteristics and limitations (listed below), which are largely a consequence of the chosen aim, research methodology and data sources used. During the interviews, respondents were asked to talk about the chatbot industry as a whole, share their understanding of the critical success factors and challenges inherent in most projects, and make general conclusions based on their previous experience. The conceptual model uses the aggregated conclusions of the authors of scientific publications or published studies of international companies. Usually, the authors present results based on the study of the experiences of a large number of different companies from different sectors and regions. The versatility of the model is, on the one hand, its advantage, as it broadens the scope. On the other hand, the desire to broaden the applicability of the model unavoidably leads to the loss of details that may play an important role in specific niches. The main features of the model and the limitations resulting from the design of this study are listed below:

- **Industry**. The study involved respondents whose experience of implementing chatbots was related to projects in companies from the retail, B2B construction and metallurgy, fintech, pharmaceutical and IT sectors. The literature review was based on the results of studies and publications analysing the experience of implementing B2B and B2C projects aimed primarily at serving the consumer sector. From this it can be concluded that the new model is most relevant in projects related to automation between customers and companies in many industries. At the same time, the study pays little attention to such specific

industries as public services, education, the military sector, and other industries whose internal organisation and processes may have a number of features and limitations that can significantly affect the possibility and method of using the chatbot in their activities. Therefore, it is likely that the new model can be used in such industries, but project teams need to pay special attention to studying the industry characteristics which are not well reflected in the model. In addition, the new model is irrelevant for technology leaders such as Amazon, Microsoft, Google and others who have strong in-house expertise and technology to build their own chatbot solutions. Similarly, smaller IT companies whose business is directly related to chatbot technology development or creation of their own platforms are unlikely to be able to apply the results of this study to their work. This is because the new model aims to help companies to apply existing solutions quickly and efficiently, rather than creating a new technology.

- **Country/Region.** The regional and cultural differences are not overtly recognised in the conceptual framework. Interview data from respondents representing multiple countries, as well as publications from many international companies, have been aggregated to form conclusions that apply equally to most countries and regions. However, regional differences can have a significant impact on chatbot implementation projects. This is mainly due to the variety of different NLP services, the availability of IT service providers, and the popularity of certain instant messengers in different countries. The need to consider local characteristics is reflected in the model in the form of the action "Explore vendor options and external service availability in your field and locality".
- **Company size.** This study is mainly concerned with the implementation of chatbots which automate the routine processes of personnel in large and medium-sized companies. Many of the challenges listed in section 6.2 are the result of the complexity of the companies' IT infrastructure, the large number of stakeholders, information security and internal regulation constraints, and team interactions problems. All this is more typical for large and medium-sized

companies, where the new model should be useful. For small businesses, the model may seem redundant and many of the recommended actions may be irrelevant. However, small business executives and their chatbot implementation teams can successfully apply the model through the elimination of redundant and irrelevant elements.

- **Internal vs external.** Companies can create a chatbot as a service for their customers and as a service for their employees. In the latter case, chatbots are often used to automate internal processes, such as IT support, access to an internal knowledge base, reporting, etc. The study did not reveal any noticeable differences in the approaches to creating internal and external chatbots. The challenges and CSFs identified apply to the same extent in both cases. Therefore, the new model for implementing chatbots is equally suitable for creating both internal and external conversational assistants.
- **Who this model is aimed at.** The main target users of the model are teams implementing chatbots in their organisations, in particular project managers. Combining elements of strategic planning and the stage model, the new model is designed to help implement project planning and control activities. In addition to project managers, it can be used by all project stakeholders, including top managers, sponsors, and team members. It can also be used by integrator teams to better organise their interactions with the customer company and manage their expectations. Ultimately, the success of the project depends on all project participants, including the integrator team, so it is important for all stakeholders to follow the recommendations of the critical success factors when they can influence them.
- **Text assistants.** The creation of voice assistants has much in common with the creation of chatbots, but includes some specific tasks related to speech-to-text conversion and speech synthesis. These and other aspects of building voice interfaces are not considered in the model. At the same time, voice assistants and chatbots have a lot in common, so the new model may be of interest to

teams building voice bots, but they should consider the specifics of speech functions development.

- **Technology dependency.** Many authors, including a Gartner study (Revang et al., 2022), point out that there is no perfect solution for building chatbots. There are hundreds of vendors on the global market offering their solutions. Depending on a variety of factors, including technological, regional and organisational, each of these platforms may seem the most appropriate for teams in their projects. For this reason, the study is not limited to any one technology or vendor but formulates general principles that are independent of the technology used. At the same time, the new model emphasises the critical importance of choosing the most appropriate platform and recommends a series of actions for choosing it.

In practice, when using the model, it is recommended to follow the top-down approach, as its structure suggests. At the earliest stage of the project (formulation of the project idea or development of the concept), the objective should be formulated. After considering many ideas, proposals and cases, teams should focus on solving one business objective. Trying to implement a chatbot in several different business processes at the same time can lead to a lack of focus and insufficient investment in the implementation of each of the planned functions, which significantly reduces the quality of the final result and most likely leads to the failure of the chatbot. On the contrary, the team's work on solving a single but important task will significantly improve the likelihood of a successful project launch. By iteratively developing the service and processing user feedback, the chat bot's capabilities can be gradually extended. In addition to the business objective, it is recommended to fill in one or more metrics that directly measure the achievement of the objective and are a tool to measure the success of the project. If the team is not ready to define the exact list of metrics at the beginning, they can be filled in or refined later in the Conception stage.

After defining objectives and selecting success metrics, the CSFs and Key Actions layers of the model should be explored sequentially. The CSFs have general formulations that can be applied to different projects, so teams are encouraged to discuss them during strategic sessions and planning events to establish a link with the real context of the organisation. By exploring the relevance of each CSF to a particular project, project stakeholders gradually prioritise their requirements and gain a comprehensive understanding of the challenges, issues, risks and opportunities associated with the upcoming chatbot implementation. By doing this work, it is also recommended to move on to the Key Actions layer, where the participants will find the reflection of the studied CSFs in the form of ready-made recommended tasks and actions. The Key Actions layer is the most detailed yet flexible part of the model. Teams may find it necessary to adapt the actions by adjusting the wording, adding or deleting single elements. For example, the task "Find an expert to join your team" may not be relevant for teams that already have an expert. At the same time, the specifics of the organisation's business, IT environment, internal rules and procedures may require important specific tasks to be solved that are not listed in the operating model. For example, there may be a number of important tasks related to integration with specific IS, creating new micro-services to implement specific planned bot functions, and preparing necessary data.

From a project lifecycle point of view, it is advisable to use the operating model as early as possible at the concept stage, or even earlier - as soon as the idea of potentially using a chatbot in a company has been raised. The model is designed to help teams with strategic planning and to shape the project's action plan, so its role is most important at the very beginning. However, at different stages of the project, the project manager and other team members can refer to the model periodically. This can help to check how well the current tasks are aligned with the critical success factors. If there are significant gaps, problems or significant changes to the project plan are needed, the operating model can be a useful tool for re-planning. In this case, repeating the

previous planning activities, from validating the objectives and reviewing the CSFs to defining the key actions, will allow the teams to update the project plan.

However, the application of the model is not limited to planning new implementations of chatbots. It can also be useful for existing services. Firstly, Operation – the final stage in the model, determines the list of actions and factors that are most critical for the project that is already running. At the same time, an iteratively evolving service constantly returns to the previous Execution phase to develop and release a new version with improved capabilities and features. Using the parts of the model associated with these phases, teams can be given guidance on how to adjust their work and improve their approaches. Secondly, managers of running chatbots can validate current management approaches and project outcomes by applying a top-down approach to an existing project. By reviewing the goal, metrics, CSFs and key actions, you can adjust the course of the project and improve project organisation to meet the critical success factors. The model can help identify and address gaps, solve known problems or improve the performance of an already successful project.

7 Conclusion

7.1 Introduction

This chapter summarises the study, the aim of which is to investigate the challenges inherent in the implementation of chatbots in organisations, as well as the development of a model that can aid the manageability of chatbot implementation. Following this introduction, section 7.2 addresses the ROs. A list of the main challenges which companies face when implementing chatbot projects addresses RO1. This section then presents the critical success factors and strategic options for the successful implementation of chatbots that have been identified in addressing RO2. At the end of the section, a new model to support the implementation of chatbots that addresses RO3 is presented. Next, section 7.3 describes the contribution of this study in terms of value to the scientific and professional communities. This is followed by section 7.4 which describes the limitations of this study, as well as possible areas for further research related to this study. Finally, section 7.5 provides the researcher's view of the possible ways in which chatbot technology will develop and the role it will play in the life of modern society.

7.2 Response to the research objectives

The results of this qualitative study, which includes a comprehensive review of publications and a case study, meet the overall research aim. While the research objectives are comprehensively addressed in chapter 6, a brief summary is provided below.

RO1: To investigate and assess the main challenges which companies face when implementing chatbot projects.

Table 11, Table 12, and Table 13 in Chapter 6 list the challenges associated with the chatbot development process in companies. Each table represents challenges relating to the three respective categories: Technology, Organisation, and User Needs. The

elements are ordered by the highest value to the lowest, which reflects the importance and prevalence of the challenges.

Technology related challenges include the complexity and amount of systems integration work, the difficulty of finding the right solution and vendor, and the overall complexity of chatbot projects, which involve dealing with different IT technologies. In addition, chatbots often require significant computing resources, which some organisations may be unwilling to invest in. The limited ability of companies to collect, analyse and use internal data for the development of appropriate chatbot behaviours is a further challenge. The implementation process can also be complicated by the complexity of internal and external regulatory and information security issues. Current chatbot technologies, while advanced, are not yet perfect, and bots sometimes fail to accurately process user requests. Finally, the licensing and support costs of chatbot platforms from leading vendors can be high, causing some organisations to consider developing their own solutions.

The **Organisation related** challenges include the difficulty of formulating project objectives, success criteria and measuring key performance indicators (KPIs). Lack of in-house chatbot expertise and limited availability of relevant specialists in the market are additional barriers. Business executives may underestimate the complexity and cost of chatbot integration projects and be unwilling to allocate a significant budget. Planning and management of chatbot projects can be difficult due to their unpredictability and high level of uncertainty. Finally, vendors and IT integrators may provide poor quality services, which is the result of a lack of experience and the relative novelty of the chatbot implementation service.

The **User needs** and chatbot performance related challenges include user scepticism and reluctance to interact with chatbots, as well as the need to adapt user behaviour to a dialogue interface. High-quality user experience (UX) design skills and user training are essential to ensure a seamless and engaging chatbot experience. The predominant scenario-based approach to building bots can limit their capabilities. In addition,

organisations struggle to develop chatbots that effectively meet the needs of the business, while also providing excellent service to users.

RO2: To identify the critical success factors and strategic options for successful chatbot implementation.

This study, based on the critical success factors (CSF) method, identified the most important components that have a significant impact on the success of chatbot implementation projects. The research findings include 59 identified CSFs that are related to three sources of their occurrence: Technology, Organisation, and User Needs. Subsequently, following the practice of applying the CSF method (Rockart, 1979), this list was reduced to the 7 most significant, broad, and universal statements that address RO2:

Focus on one business objective. Trying to handle multiple unrelated tasks formulated by various stakeholders with a single bot can distract the project team from the bot's main objective. Instead, teams should prioritise their actions and avoid the development of unnecessary features. Thus, the resources can be used efficiently to achieve a high-quality result that is aligned with the business needs.

The chosen platform and technology which best suit the current needs. The number of chatbot platform developers is large and they focus on different niches. Choosing the chatbot platform that best fits the company's needs is a challenging process. Early involvement of the IT team helps to consider technical limitations and corporate standards. Integration with the company's information systems should be analysed, including ready-made connectors and APIs. A powerful dialogue editor enables rapid prototyping and scenario building by the internal team. Detailed reporting and robust testing tools are essential for evaluating performance and continuous improvement.

System integration and data migration tasks are in focus. Effective integration of chatbots with other IS is critical to their functionality, as chatbots rely on data from different enterprise IS. Challenges result from differences in technologies, system

ownership, priorities and management approaches across systems. Chatbot success depends on anticipating and managing these difficulties throughout the project lifecycle.

Chatbot expert is in your team. Teams often lack the expertise to address the organisational and technical challenges associated with the chatbot integration process. This can be addressed in a number of ways, either by hiring external consultants or by finding expertise within the organisation. Different specialists may be required at various stages of the project, as no one person may have expertise in all aspects of chatbot implementation.

The MVP method and an iterative approach are used. To deal with high level of unpredictability and to be able to adapt to change, teams should adopt agile and MVP methodologies. It is more effective to release limited but well-developed functionality rather than trying to release all features at once. By applying these principles, studying user needs, and adjusting service by studying user feedback, chatbot teams can achieve the flexibility needed to create a high-quality and user-friendly service.

Chatbot is the best way to solve users' problem. Chatbots are often developed by companies to either replace humans or improve the user experience of existing digital services. To be successful, chatbots should provide additional benefits to users, such as convenience and immediate answers. If a chatbot does not provide these benefits, it is unlikely to be used regularly. Teams should consider identifying use cases of successful chatbot applications and analysing alternatives to justify the use of a chatbot. During implementation and maintenance, they should ensure that the bot improves the customer experience, and study user needs to plan future feature development.

Chatbot productivity is the top priority. A productive chatbot is characterised by its simplicity, intuitive user experience and effective ability to solve user problems. Designing a great user experience is crucial. In addition, implementing a blended communications approach that seamlessly transitions to human agents when the

chatbot is unable to handle user queries can improve overall performance. Tracking chatbot behavioural metrics and success indicators helps with continuous optimisation.

RO3: To develop and validate a conceptual framework and/or operational model to support the chatbot implementation process and deliver expected chatbot project outcomes.

The main outcome of this study is the New model for chatbot implementation, shown in Figure 39. The model is primarily designed for project managers responsible for implementing chatbots in organisations, but can also be used by other project stakeholders, including top management, the project team or integrator companies. The model can help organisations considering implementing a chatbot to take a holistic approach to project planning. The structure of the model implies the use of a top-down approach that links the company's strategic objectives with specific steps to deliver the expected outcomes.

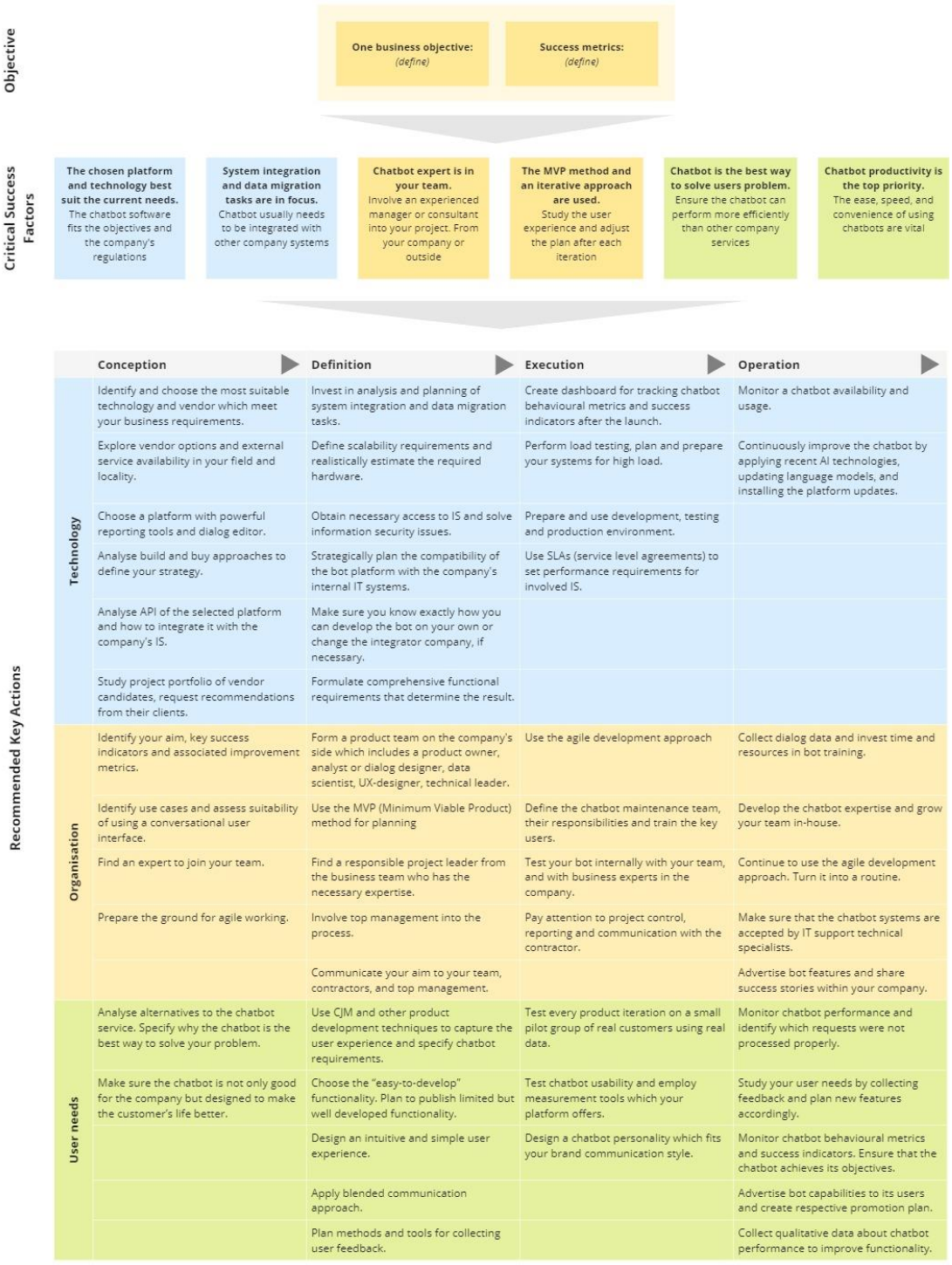


Figure 39. New chatbot implementation model

The new model comprises three levels: Objectives, CSFs, Recommended Key Actions. At the earliest stage of project planning, strategic objectives are defined. The formulation

of objectives is accompanied by the definition of appropriate metrics that reflect the achievement of these objectives. The model calls for limiting the functionality of the first version of the chatbot, strictly focusing on one business objective and choosing one or more metrics that match this objective.

After defining objectives and success metrics, the CSFs and key actions are explored. The CSFs presented and characterised above in this section are factors that are applicable to different projects and should be discussed by the team in strategic meetings. By analysing the relevance of each CSF to their specific project, chatbot implementation teams can prioritise their requirements and understand the challenges and opportunities associated with chatbot implementation. The Recommended Key Actions layer reflects the CSFs and provides recommended tasks and actions. This layer is detailed and flexible, so certain tasks can be modified, removed or added depending on the organisation's context and specific project requirements. The result of using the lower part of the model is an updated list of key actions, which is a top-level action plan for planning, developing and launching a new chatbot.

Colours highlight three categories that determine the sources of factors that affect chatbot projects. The blue colour combines CSFs and Recommended Key Actions that are of a technological nature, the elements associated with organisational aspects are highlighted in yellow, and those that ensure the fulfilment of user needs are highlighted in green. The Recommended Key Actions are also divided into four columns. Each column corresponds to one of the four phases, which are universal and typical for most projects: Conception, Definition, Execution, and Operation.

The application of the model by teams in practice supports the development of a holistic and comprehensive approach to planning and managing virtual chatbot implementation projects. By linking the strategic level of business objectives, critical success factors and key actions, the new model creates the foundation for successfully building and launching virtual assistants. This was confirmed by experts during the validation process, who noted that this model can make chatbot projects more

manageable and increase their chances of success. The model therefore fully meets the objective of RO3, and its formulation is the achievement of the aim of this study.

7.3 Contribution to theory and practice

The starting point of this research was a review of academic papers and professional publications that reflect different aspects of the implementation of chatbots. The review compiled a list of challenges that companies face when implementing chatbots and identified critical success factors specific to such projects. Next, the practical part of the study used the case study strategy and survey and observation as data collection techniques and supplemented the information from the literature review. The lists of challenges and critical success factors were evaluated, validated and updated based on the research findings. The list of critical success factors specific to chatbot implementation projects, consisting of 59 elements (Figure 33), is one of the most comprehensive among similar lists found in publications.

The main contribution of this research is the new model for successful chatbot implementation, which is designed to support the development process and deliver the expected outcomes of such projects. The study used an inductive approach, analysing the theoretical basis and research findings to create the new model. The new model, along with the patterns and general rules identified as a result of the study should be of interest to researchers and practitioners involved in the implementation of virtual assistants and other projects related to new technology adoption. It provides answers to common questions about chatbot integration and offers a holistic, universal approach that links strategic business objectives with practical steps to achieve them.

The design of the model builds upon several widely used models and frameworks, the elements of which are combined into a new structure that reflects the problem of strategic planning of chatbot implementation projects. The TOE framework (DePietro et al., 1990), which is popular for studying how organisations adopt new technologies, is used in this study in a modified form. This research once again confirms the universality

and wide applicability of the TOE framework, as well as the possibility and suitability of making modifications to its structure depending on the context of application, as other researchers have done (Wynn et al., 2021). The stage model by Nicholas et al. (2017) became a part of the design of the new model, adding a project management perspective to the implementation of chatbots. The use of stage models shows that project management models such as the model by Nicholas et al. (2017), or other common models such as Waterfall or the V-model, can be used effectively in combination with other models, complementing the design with a process-oriented approach. The top-down approach proposed by Earl (1989) has proven its flexibility and applicability in the context of solving contemporary strategic planning problems. Finally, the popular CSF method (Bullen et al., 1981) was used as a tool to investigate the factors that determine the success of chatbot implementation projects. In all of these contexts, it can be concluded that this study extends the existing knowledge of the models and frameworks mentioned and demonstrates the possibilities of their application in a new context, as well as in combination with each other.

Flexibility, versatility and its generic nature are the characteristics of this model, which is designed to help a large number of teams from different countries and regions in chatbot development projects. It is relevant to projects across a range of industries, especially those aimed at automating communication between companies and their customers. It is designed for large and medium-sized companies that want to automate routine processes because the structure and content are largely the result of studying the problems of implementing chatbots in large and medium-sized organisations. However, the model can also be used in small company projects, in which case managers applying the model are advised to omit redundant elements. Both internal and external chatbots can benefit from the use, as the research shows no noticeable differences in the approaches to creating them. The model does not specifically address voice assistants, but teams building voice bots may still find it valuable in considering the specific aspects of voice development. The results of this study may be of most use

to project managers responsible for implementing chatbots in organisations. However, it can also be useful for other team members and stakeholders, including the project sponsor, IT directors and representatives from the contractor companies. IT integrator teams that provide chatbot implementation services can also benefit from its use by improving their processes, and understanding the needs of client organisations and meeting their expectations.

It is expected that the greatest practical impact will be achieved when the new model is used by teams with no or minimal experience in implementing chatbots. In this case, the model helps to overcome uncertainty, form a strategic approach in the early stages, and identify key decision options and risks. It can also help in the preparation of the project plan. As the project progresses, the model can be used as a blueprint for how the project will evolve and as a handy guide to help the team achieve success. Applying the model does not necessarily guarantee the success of the project, but it will go a long way towards structuring the project work, anticipating risks and making the right decisions at different stages of the project. Other applications are also possible, such as use in live projects. A chatbot operating in a production environment is usually constantly changing, improving and adding new features. Such projects correspond to the Execution and Operation phases of the model, and teams can use the right side of the model to analyse and possibly adjust their approaches. Experienced and novice managers responsible for the development of chatbots that have already been launched can use the new model, among other things, to conduct a retrospective analysis of the management approaches used to identify possible gaps and previously unaccounted for factors. Used as a checklist it can help identify possible reasons for the poor performance of some projects or find opportunities to reduce risk and grow successful projects.

7.4 Limitations and future research

The most common limitation faced by researchers are resource constraints and difficulties in accessing information. In addition, methodological choices may not be

ideal in terms of research objectives, but are influenced by the possibilities available to the researcher (Kumar, 2014). All these constraints are to some extent present in this study. Firstly, the topic of chatbots is popular and evolving rapidly. A large number of researchers are working in this area and publishing their scientific papers on a regular basis. Despite the fact that this paper provides an extensive and comprehensive review of scientific papers from notable researchers and publications from leading companies, a significant number of publications have not been studied, as it is not possible to cover them all. Secondly, the selection of interviewees is not ideal, but rather reflects the opportunities available to the researcher. Nevertheless, in total, fifteen respondents took part in the study, representing six industries, three countries and speaking two languages. This diversity allows this study to identify common patterns that are characteristic of chatbot projects in general, regardless of industry and country, but the researcher concedes that increasing the number of interviewees many times over, adding representatives from other industries and countries, could significantly improve the research quality and the possibilities for generalisation.

Finally, the study of several cases from different companies in different sectors would provide a richer and more diverse set of research data. The choice to study only one case was determined by the researcher's capabilities and time frame. In many ways, this shortcoming was minimised by the use of a multi-method and two data collection techniques, interviews and observation. At the same time, at the initial stage of the study, the researcher considered the option of using action research as a strategy that would make it possible to study the process of implementing a chatbot evolutionarily, observing the development of chatbots at ESteelCo in the form of successive cycles of introducing new versions of a chatbot using the new model. This would make it possible to test previously acquired knowledge and iteratively improve the model. However, such an application of action research was not possible due to the time constraints of the study and the lack of an organisation willing to perform a series of implementations for the purposes of the study. The choice of case study as a research

strategy therefore proved to be optimal in terms of achieving the aim of the study and the availability of opportunities for the researcher.

The model is generic enough to be configurable and customizable. On the one hand, it has the advantage of being applicable to a wide range of industries, types of projects and countries, as the approaches and methods of data collection were chosen accordingly, and the researcher's efforts were directed towards finding common patterns and characteristics that are typical for the implementation of chatbots in general. However, the broad orientation of the model can also be a disadvantage. The lack of a narrow focus on one industry, technology or cultural region may miss important specific details that can play a significant role in the success of certain types of projects. This should be taken into account in practice. It is assumed that the model should be used as a flexible framework that forms a basis for chatbot implementation strategic planning, but the team should consider the Key Actions layer as a preliminary list of broad recommendations that can be significantly expanded and adapted in the process of analysing their project and its context through the prism of the critical success factors embodied in the model.

The suggested areas for further research are largely derived from the limitations of this study. Most of these recommendations are also reflected in the comments received from experts who participated in the process of validating the results of the study (section 6.5). The resulting new model for implementing chatbots can serve as a starting point for research in the following directions:

- A wider range of interviews across different industries and geographic regions would provide a more comprehensive understanding of chatbot implementation processes. This approach may require the study of additional cases, leading to improved generalisability of the model.
- Practical testing of the model in real project implementations is essential for validation and evolution. The use of action research strategy would provide an

opportunity to study successive cycles of chatbot development, thereby enabling iterative improvement and optimisation.

- Exploring the individual elements of the model as independent research directions may reveal new valuable details and knowledge related to this study. For example, "The chosen platform and technology best suit the current needs" is one of the most critical success factors identified in this study. However, in this study, approaches to platform selection are considered superficially, as it is impossible to study such a complex and broad topic within the scope of this research. A separate study on approaches and methodologies for platform selection can be an important complement to the current study and useful to the professional and academic community.
- The rapid development of AI technologies and their deep integration into the business processes of companies and the lives of ordinary people is accompanied by increasing cybersecurity threats. General cybersecurity standards such as ISO-IEC 27001 and ISO-IEC 9001 can be applied to chatbot implementation projects, but their application is not sufficient (ENISA, 2023). Existing standards do not cover all aspects of the rapidly evolving technology, and the sources of threats are not only related to software and hardware infrastructure, but also to the human factor (Kör & Metin, 2021). Much research is being done in this area, the results of which can significantly improve the model with a cybersecurity component and make it more applicable to chatbot implementation areas where cybersecurity aspects are critical (banking, healthcare, military and others).
- It is essential that the framework is regularly reviewed and updated in line with the latest technological advances in the industry to ensure the relevance of the model. This approach would help the model to be in line with emerging technologies and be used in practice. Particularly in recent years, there has been a rapid development of LLMs and their application to solving practical problems, including the creation of chatbots. OpenAI's ChatGPT deserves special attention. It has shown impressive results since the end of 2022, and many experts predict

that this technology will transform entire industries in the near future. The rapid evolution of this technology will inevitably require updates and revisions to the approaches and conclusions of this study. At the time of the research completion in 2023, ChatGPT can be considered as one of the most advanced NLP tools. This notwithstanding, the issues addressed in this research, as well as the new model to aid teams in solving chatbot problems in the context of an organisation, remain relevant.

7.5 Final comments

The future of chatbots in the business area is directly connected to how companies will overcome the challenges identified in this study, and what new methods and tools will be created to help them. When analysing these challenges, it can be seen that they are mostly related to the high volume and complexity of integration work. In order for a chatbot to perform its functions, companies need to find a way to pass the necessary data to it, create an API for a two-way data exchange scheme. Many of the existing IS in organisations are not ready for this. It can be assumed that this problem will be solved in two ways. On the one hand, the creators of chatbot platforms will develop special connectors for quick connection to popular enterprise IS. On the other hand, software vendors will embed chatbot solutions into their products, providing a way for companies to deploy chatbots relatively quickly.

The creation of domain- and function-specific chatbots is another trend that helps to address challenges such as the complexity of integration work, the high cost and duration of implementation, poor quality of service and unjustified user expectations. By investing significant resources in creating high-quality niche solutions, such as chatbots for HR, IT helpdesk, sales and marketing and other functions, and considering the specifics of individual industries, chatbot solution providers can significantly improve the quality, performance and reduce the cost of chatbot implementation projects by replicating successful experiences.

Chakrabarti et al. (2019) predict that in the future, chatbots in companies will be organised into groups of virtual assistants that perform different functions but have a single interface for the customer. This idea is supported and developed by two interviewees at CTO level, who predict that chatbots will evolve as a system of virtual agents within an organisation. Each individual bot will be quite autonomous, performing one or a very small number of functions. This approach is in many ways similar to the microservice architecture approach. However, unlike Chakrabarti et al. (2019), the interviewees state that the virtual assistants should be represented by different virtual personas. This is similar to how customer service works with participation of human employees. Using the example of an airline company, one chatbot may be responsible for selling tickets, a second one will perform check-in operations, and a third one will help issue a ticket refund if necessary. This is expected to help solve some of the problems associated with the dialogue interface and the limited functionality of chatbots, as the inconvenience of using chatbots is often due to users not understanding the functions of a chatbot, what it can and cannot do.

The theoretical perspectives of chatbots are also directly connected to the future of AI, and the direction in which this new technology will grow. AI can potentially change whole industries, completely transforming the way how people use traditional services. The series of industrial revolutions has dramatically improved the quality of humans' life, reduced toil, and offered new comfortable office jobs due to the use of machines and automation. Each turn led to a reduced number of routine tasks made by humans and increased overall productivity. The forthcoming AI revolution aims to substitute humans in doing mental tasks and potentially create machines that can complete all jobs done by humans now, faster and more accurately. The key question that arises from this is "what is the role that will be given to humans when AI becomes as powerful and can perform better and cheaper than humans?" (Makridakis, 2017). There are four possible scenarios in relation to this question proposed by Makridakis (2017) noted below.

The **optimists** believe in the utopian future where humans' brains will be connected directly to an artificial intelligence located in a cloud computer. Achievements in nanotechnology, robotics, and genetics will extend human abilities with extra memory, calculation resources, and solutions that make it possible to share knowledge between humans and machines. As a result, robots will take responsibility for all work, leaving people spending time as they want and perform only those activities that they are interested in. Chatbots, as a communication interface between humans, many become redundant due to the ability of machines and human brains to communicate directly via a network. However, a dialog in oral, written, or mental form may remain a popular means to give orders to robots.

According to **pessimists**, robots will become more intelligent while social problem more complex. Humans will let the machines to participate in many vital activities and perform better than humans. This will result in a dangerous situation that the machines make all the critical decisions, whereas humans become a second-class society that heavily depends on the AI (Joy, 2000). The pessimistic scenarios may not be necessarily harmful or negative for human beings. The robots may treat people as their "pets" and care for them, but this new world will be very different. Google's autonomous driving car demonstrates how the first step into this future may look like. Despite many limits in use, robotic cars already drive safely, they do not consume alcohol, do not get tired, and rarely get into car accidents comparing to human drivers. Soon, the robots will completely dominate in this area, reducing the number of accidents to the absolute minimum, while people may lose their right to drive. In this pessimistic future, chatbots will become an integral part of any autonomous machine or virtual character connecting machines and humans the way that is more suitable for the latter.

The **pragmatists** represent the minority that, in contrast to optimists and pessimists, believe in the positive future of machines and humans. They predict that powerful AI can be controlled by regulations, special algorithms, or a chip that can prevent any dangerous behaviour. Markoff (2016) mentions two scenarios related to the forthcoming

future of AI and people. The first one presumes that AI will substitute humans in doing their jobs better and cheaper. According to the second scenario, new technology will extend humans' capabilities and improve their overall performance. Being driven by their commercial interest, businesses push chatbots to follow the first way and anticipate having bots instead of expensive cell centre operators, service managers, sales personnel, and others.

Finally, the **doubters** do not accept that AI will ever become a threat to people. Even when AI becomes powerful enough to perform better than humans, it fails to compete with the creativity of people. Jankel (2015) describes the advantage of humans as an ability to break the rules and be "anti-algorithmic". Such behaviour is impossible for robots due to their algorithmic nature, whereas creative breakthroughs usually performed by leaders who sometimes think irrationally. Like in the pessimistic future, chatbots for doubters may become an essential interface to communicate with machines.

People like to debate the question of when machines will reach human intelligence and whether it is going to happen. Pan (2016) states that it possible in some specific areas only while for general intelligence it will unlikely happen within the next 60 years. He points on the fundamental difference in forms of modern AI and human's natural biological intelligence, and predicts a successful future for human-machine hybrid systems. Grace et al. (2017), who have examined the opinions of many AI experts, conclude that as artificial intelligence develops, it will gradually replace humans in various industries. Around 2024, machines will surpass humans at translating text from one language to another; by 2026, they will be able to write school essays; by 2027, they will drive autonomous trucks; and by 2031, they will replace retail workers. The creation of ChatGPT and its release to the public at the end of 2022 shows that the development of AI is moving much faster. Goldman Sachs Research (Goldman Sachs, 2023) claims that more than 75% of the 900 jobs analysed can be automated to some extent using ChatGPT. At the same time, the authors of the study argue that there is no

reason to believe that robots will completely replace humans in the near future. In most cases, AI will complement a person, extending their capabilities, performing routine tasks and leaving decision-making and creative tasks to a human. The latest Microsoft research (Bubeck, 2023) shows that the recently published model developed by OpenAI, GPT-4 demonstrates breakthrough results in solving original problems from various fields, including mathematics, programming, physics, medicine, psychology, etc. In addition, the model perfectly generates high quality, concise text and, according to many tests, can be considered as a largely Artificial General Intelligence (AGI) system.

Irrespective of which future from those listed above happens, AI will play a critical role in our society. The machines may substitute people in certain areas or augment their skills, they may become a threat or aid for humanity, in any case, they are already becoming a part of our daily life. A comparison of employees in the traditional organization with innovative leaders shows that the latter have a much higher revenue per employee rate. Effective use of new technology that includes AI-powered solutions enables them to automate repetitive tasks and achieve better productivity. As a result, they invest more in new technology and actively hire talented engineers while decrease demand for employees with low qualifications (Makridakis, 2017). As this trend continues, our society will be involved more in creative activities in the near future. Retrospective analysis of the industrial revolutions shows that each technological breakthrough produces more new jobs than those that it eliminates (Stewart, Debapratim & Cole, 2015). This inclines the researcher to adopt an optimistic view of the future, despite the many unknowns that lie ahead.

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Appendix 1

Contact
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02 Nov 2021

INTERVIEW BRIEF

Research on a new model for chatbot implementation in organisations

Research Background

Despite the many advantages of chatbots, implementation projects are still very challenging for organizations. Modern AI algorithms enable robots to process human speech effectively, convert speech to text, recognize meanings from the text, and identify users' intentions. Leading tech corporations such as IBM, Google, Amazon, and Microsoft provide cloud services that allow technical teams to deploy AI-powered conversational bots relatively quickly. However, available online services and open-source software cannot solve company-specific problems that concern implementation of custom bot behavior, data preparation, integration, and other challenges.

Purpose of the research

This research aims to study the challenges inherent in chatbot integration projects and develop solutions which can aid the manageability of chatbot implementation. A new model for successful chatbot implementation will be developed in this project. This model can support IT integrators, business process managers, and industry practitioners and specialists that are involved in chatbot creation and deployment.

The objectives of the research are:

- to investigate and assess the main challenges which companies face when implementing chatbot projects;
- to identify the critical success factors for successful chatbot implementation;
- to develop and validate a conceptual framework and/or operational model to support the chatbot implementation process and deliver expected chatbot project outcomes.

Methodology

The research project is undertaken in cooperation with ESteelCo and involves real-world problems that enterprises experience when implementing and operating chatbots. The chatbot is being created as a real operating service for the company. Focusing on a specific topic - "chatbot for customer support" - the researcher contributes to the project and explores the chatbot integration process as a scientific phenomenon.

A new framework or model for chatbot implementation will be created as the result of the participant observation and data collection during the case study.

Semi-structured interviews and areas of discussion

Section 1. Challenges which companies face when implementing chatbot projects		
Area	**What are the main challenges which companies face when implementing chatbot projects?**	**What are the actions which companies could perform to overcome these challenges?**
Factor related areas:		
Technology related		
Organisation related (Strategy, Structure, Employees, Communication, Project management, etc)		
User needs and chatbot performance related		
Other:		

Section 2. Critical success factors for successful chatbot implementation				
What are the critical success factors for successful chatbot implementation? ***Please name success factors in relation to the project phase and category and discuss respective actions which help companies to achieve mentioned objectives.***				
	Conception	**Definition**	**Execution**	**Operation**
Technology	*CSF1* *CSF2*			
Organisation				
User needs				

Your Involvement

You have been invited to take part in this research, but participation is entirely voluntary. Taking part in the research will involve talking to the researcher from the University of Gloucestershire for approximately two hours, probably spread over two or three interview sessions, at a time and location that is convenient to you. All information will remain strictly confidential, and all names will be anonymised.

Confidentiality

The information that you provide is anonymous. The information will be stored using numerical codes on a password-protected computer or password-protected cloud storage. Your name will not be included with your interview data. Your responses may be used in the thesis but will be anonymised. Only group information will be given in any reports of the study, with no indication of any participant's identity.

Results

The results of this research will be part of the doctoral thesis. The research may also be published in the form of academic papers in management journals and presented at academic conferences to disseminate the research findings.

Researcher and supervisors

Dr. Martin Wynn and Professor Kamal Bechkoum (University of Gloucestershire, UK) are the principal supervisors for the study who will oversee the work of the researcher. Alexander Skuridin is the researcher on the project and will be conducting the research for his doctoral thesis.

Further information

If you have any questions about this research, or require further information, please contact the study researcher at the email address indicated above.

Thank you for your interest and participation!

Appendix 2

UNIVERSITY OF GLOUCESTERSHIRE
at Cheltenham and Gloucester

Consent for participation in a research interview

Institution	University of Gloucestershire (UK), School of Computing and Engineering The Park, Cheltenham, GL50 2RH. Telephone +44 (0)1242 714700
Project title	A new model for chatbot implementation in organisations
Researcher	Alexander Skuridin (M.Sc.) is a business researcher at the University of Gloucestershire.
Principal supervisors	Dr. Martin Wynn - Associate Professor of Information Technology in the School of Computing and Engineering (University of Gloucestershire, UK). Professor Kamal Bechkoum - Head of our School of Business and Technology and Director of the C11 Cyber Innovation Centre (University of Gloucestershire, UK)

I agree to participate in a research project led by Alexander Skuridin from the University of Gloucestershire, UK. The purpose of this document is to specify the terms of my participation in the project through being interviewed:

- I have been given sufficient information about this research project. The purpose of my participation as an interviewee in this project has been explained to me and is clear.
- I understand the benefits and risks involved in taking part in this research study.
- My participation as an interviewee in this project is voluntary. There is no explicit or implicit coercion whatsoever to participate.
- Participation involves being interviewed by a researcher from the University of Gloucestershire, UK. The interview will last approximately 1-2 hours. I allow the researcher to take written notes during the interview. I also allow the recording by audio of the interview. It is clear to me that in case I do not want the interview to be taped I am at any point of time fully entitled to withdraw from participation.
- I understand that I free to refuse participation, or to withdraw from the study at any time, without consequence, and that my information will be withdrawn at my request.
- I understand that the research team will keep my data confidential.

Participant: _____ Signature: _____ Date:_____

Researcher: Alexander Skuridin Signature: _____ Date:_____

For further information please contact: Alexander Skuridin, University of Gloucestershire (UK),
Email: , Website: www.glos.ac.uk

Appendix 3

Contact
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May 2023

VALIDATION FORM

Research on a new model for chatbot implementation in organisations

Purpose of the research

This research aims to study the challenges inherent in chatbot integration projects and develop solutions which can aid the manageability of chatbot implementation. A new model for successful chatbot implementation is developed in this project. This model can support IT integrators, business process managers, and industry practitioners and specialists that are involved in chatbot creation and deployment.

Model usage

The new chatbot implementation model (Figure 1) is designed for use in chatbot implementation projects at large and medium organisations across a range of industries. It provides business leaders and project teams with a structured approach to planning key project tasks, reducing risk and increasing the chances of successful deployment and maintenance. Under the conditions of high uncertainty inherent in most AI implementation projects, and also given the lack of experience of teams in implementing similar services, the model serves as a guide for developing an action plan that focuses on the most important aspects at each stage of the project.

In practice, when using the model, it is recommended to follow the top-down approach, as its structure suggests. At the earliest stage of the project (formulation of the project idea or development of the concept), the objective should be formulated. After considering many ideas, proposals and cases, teams should focus on solving one business objective. Trying to implement a chatbot in several different business processes at the same time leads to a lack of focus and insufficient investment in the implementation of each of the planned functions, which significantly reduces the quality of the final result and most likely leads to the failure of the chatbot. On the

contrary, the team's work on solving a single but important task will make it possible to launch the first version of the virtual assistant, which will perform the task very well. By iteratively developing the service and processing user feedback, the chat bot's capabilities can be gradually extended. In addition to the business objective, it is recommended to fill in one or more metrics that directly measure the achievement of the objective and are a tool to measure the success of the project. If the team is not ready to define the exact list of metrics at the beginning, they can be filled in or refined later in the concept stage.

Objective

One business objective: *(define)*	Success metrics: *(define)*

CSFs

The chosen platform and technology best suit the current needs	System integration and data migration tasks are in focus	Chatbot expert is in your team	The MVP method and an iterative approach are used	Chatbot is the best way to solve users problem	Chatbot productivity is the top priority

Key Actions

	Conception	Definition	Execution	Operation
Technology	Identify and choose the most suitable technology and vendor which meet your business requirements.	Invest in analysis and planning of system integration and data migration tasks.	Create dashboard for tracking chatbot behavioural metrics and success indicators after the launch.	Monitor a chatbot availability and usage.
	Explore vendor options and external service availability in your field and locality.	Define scalability requirements and realistically estimate the required hardware.	Perform load testing, plan and prepare your systems for high load.	Continuously improve the chatbot by applying recent AI technologies, updating language models, and installing the platform updates.
	Choose a platform with powerful reporting tools and dialog editor.	Obtain necessary access to IS and solve information security issues.	Prepare and use development, testing and production environment.	
	Analyse build and buy approaches to define your strategy.	Strategically plan the compatibility of the bot platform with the company's internal IT systems.	Use SLAs (service level agreements) to set performance requirements for involved IS.	
	Analyse API of the selected platform and how to integrate it with the company's IS.	Make sure you know exactly how you can develop the bot on your own or change the integrator company, if necessary.		
	Study project portfolio of vendor candidates, request recommendations from their clients.	Formulate comprehensive functional requirements that determine the result.		
Organisation	Identify your aim, key success indicators and associated improvement metrics.	Form a product team on the company's side which includes a product owner, analyst or dialog designer, data scientist, UX-designer, technical leader.	Use the agile development approach	Collect dialog data and invest time and resources in bot training.
	Identify use cases and assess suitability of using a conversational UI.	Use the MVP method for planning	Define the chatbot maintenance team, their responsibilities and train the key users.	Develop the chatbot expertise and grow your team in-house.
	Find an expert to join your team.	Find a responsible project leader from the business team who has the necessary expertise.	Test your bot internally with your team, and with business experts in the company.	Continue to use the agile development approach. Turn it into a routine.
	Prepare the ground for agile working.	Involve top management into the process.	Pay attention to project control, reporting and communication with the contractor.	Make sure that the chatbot systems are accepted by IT support technical specialists.
		Communicate your aim to your team, contractors, and top management.		Advertise bot features and share success stories within your company.
User needs	Analyse alternatives to the chatbot service. Specify why the chatbot is the best way to solve your problem.	Use CJM and Jobs-To-Be-Done methods to capture user experience and specify chatbot requirements.	Test every product iteration on a small pilot group of real customers using real data.	Monitor chatbot performance and identify which requests were not processed properly.
	Make sure the chatbot is not only good for the company but designed to make the customer's life better.	Choose the "easy-to-develop" functionality. Plan to publish limited but well developed functionality.	Test UX and employ measurement tools which your platform offers.	Study your user needs by collecting feedback and plan new features accordingly.
		Design an intuitive and simple UX.	Design a chatbot personality which fits your brand communication style.	Monitor chatbot behavioural metrics and success indicators. Ensure that the chatbot achieves its objectives.
		Apply blended communication approach.		Advertise bot capabilities to its users and create respective promotion plan.
		Plan methods and tools for collecting user feedback.		Collect qualitative data about chatbot performance to improve functionality.

Figure 1. New chatbot implementation model

After defining objectives and selecting success metrics, the CSFs and Key Actions layers of the model should be explored sequentially. The CSFs have general formulations that can be applied to different projects, so teams are encouraged to discuss them during strategic sessions and planning events to establish a link with the real context of the organisation. By exploring the relevance of each CSF to a particular project, project stakeholders gradually prioritise their requirements and gain a comprehensive understanding of the challenges, issues, risks and opportunities associated with the upcoming chatbot implementation. By doing this work, it is also recommended to move on to the Key Actions layer, where the participants will find the reflection of the studied CSFs in the form of ready-made recommended tasks and actions. The Key Actions layer is the most detailed yet flexible part of the model. Teams may find it necessary to adapt the actions by adjusting the wording, adding or deleting single elements. For example, the task "Find an expert to join your team" may not be relevant for teams that already have an expert. At the same time, the specifics of the organisation's business, IT environment, internal rules and procedures may require important specific tasks to be solved that are not listed in the operating model. For example, there may be a number of important tasks related to integration with specific IS, creating new micro-services to implement specific planned bot functions, and preparing necessary data.

From a project lifecycle point of view, it is advisable to use the operating model as early as possible at the concept stage, or even earlier - as soon as the idea of potentially using a chatbot in a company has been raised. The model is designed to help teams with strategic planning and to shape the project's action plan, so its role is most important at the very beginning. However, at different stages of the project, the project manager and other team members can refer to the model periodically. This can help to check how well the current tasks are aligned with the critical success factors. If there are significant gaps, problems or significant changes to the project plan are needed, the operating model can be a useful tool for re-planning. In this case, repeating the previous planning activities, from validating the objectives and reviewing the CSFs to defining the key actions, will allow the teams to update the project plan.

However, the application of the model is not limited to planning new implementations of chatbots. It can also be useful for existing services. First, the last stage, Operation, determines the list of actions and factors that are most critical for the project that is already running. At the same time, an iteratively evolving service constantly returns to the previous Execution phase to develop and release a new version with improved capabilities and features. Using the parts of the model associated with these phases, teams can be given guidance on how to adjust their work and improve their approaches. Secondly, managers of running chatbots can validate current management approaches and project outcomes by applying a top-down approach to

an existing project. By reviewing the goal, metrics, CSFs and key actions, you can adjust the course of the project and improve project organisation to meet the critical success factors. The model can help identify and address gaps, solve known problems or improve the performance of an already successful project.

Your Involvement

You have been invited to take part in this research, but participation is entirely voluntary. Taking part in the research will involve talking to the researcher from the University of Gloucestershire for approximately two hours, probably spread over two or three interview sessions, at a time and location that is convenient to you. All information will remain strictly confidential, and all names will be anonymised.

Confidentiality

The information that you provide is anonymous. The information will be stored using numerical codes on a password-protected computer or password-protected cloud storage. Your name will not be included with your interview data. Your responses may be used in the thesis but will be anonymised. Only group information will be given in any reports of the study, with no indication of any participant's identity.

Results

The results of this research will be part of the doctoral thesis. The research may also be published in the form of academic papers in management journals and presented at academic conferences to disseminate the research findings.

Researcher and supervisors

Dr. Martin Wynn and Professor Kamal Bechkoum (University of Gloucestershire, UK) are the principal supervisors for the study who will oversee the work of the researcher. Alexander Skuridin is the researcher on the project and will be conducting the research for his doctoral thesis.

Further information

If you have any questions about this research, or require further information, please contact the study researcher at the email address indicated above.

Thank you for your interest and participation!

QUESTIONNAIRE

Imagine you are a project manager in a large or medium-sized company that is planning to implement a chatbot or is already using and improving a chatbot. Following the survey instructions below, evaluate the possibility of using the new model (Figure 1) to perform a wide range of tasks related to project planning and implementation.

Question 1. ***Evaluate the structure of the model. How clear are the elements represented in the model and the relationships between them?***	
5	The structure of the model is very clear and does not require additional explanation
4	The structure of the model is generally clear, but some elements may raise questions
3	The structure of the model is fairly clear, but additional explanation is needed to use it
2	Many elements of the model raise questions
1	The structure of the model is unclear
Please explain your answer in 3-5 sentences	

Question 2. ***How do you evaluate the completeness of the critical success factors (CSFs) of the model, as well as the accuracy of the wording in terms of a typical chatbot implementation project?***	
5	The list of CSFs is complete, and the wording is accurate
4	The list of CSFs is quite complete, but its wording or individual elements may be slightly adjusted.
3	The list of CSFs makes sense, but its wording or individual elements may need to be adjusted
2	The list of CSFs and its wording poorly correspond to the reality of projects for the implementation of chatbots
1	The list of CSFs and their wording are irrelevant
Please explain your answer in 3-5 sentences	

Question 3. ***How do you evaluate the completeness of the Key Actions of the model, as well as the accuracy of the wording in terms of a typical chatbot implementation project?***	
5	The list of Key actions is complete, and the wording is accurate
4	The list of Key Actions is quite complete, but its wording or individual elements may be slightly adjusted.
3	The list of Key Actions makes sense, but its wording or individual elements may need to be adjusted
2	The list of Key Actions and its wording poorly correspond to the reality of projects for the implementation of chatbots
1	The list of Key Actions and their wording are irrelevant
Please explain your answer in 3-5 sentences	

Question 4. ***Do you agree or disagree with the following statement: The new model for chatbot implementation can aid the manageability of chatbot projects and increases their chances of success.***	
5	Strongly agree
4	Agree
3	Neutral
2	Disagree
1	Strongly disagree
Please explain your answer in 3-5 sentences	