REVE Chat

Present & Future Use Cases of

Banking Chatbot

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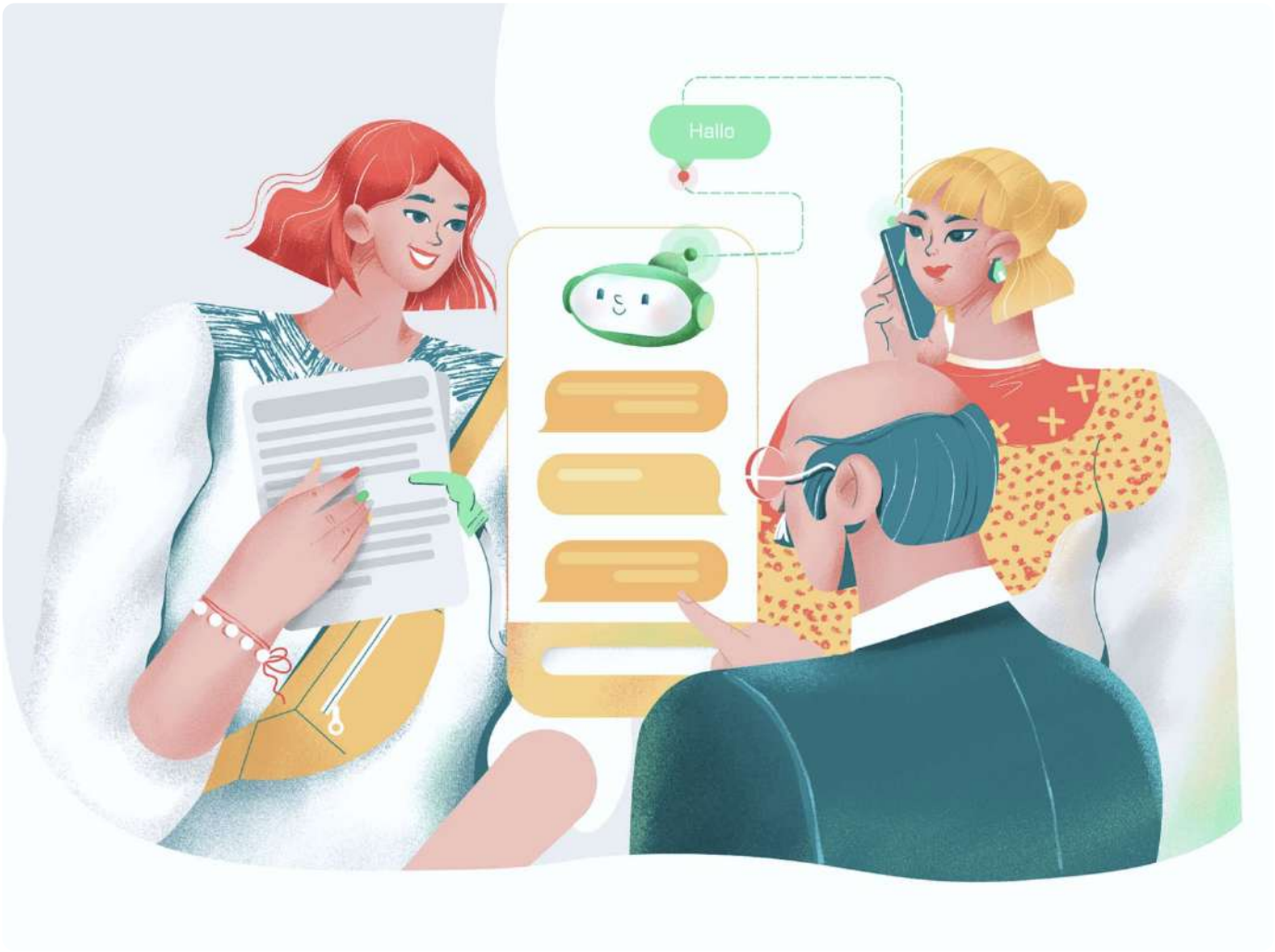
Abstract



People are no longer willing to stand in long lines to conduct banking operations due to their busy schedules. Thus, mobile banking, net banking, and trendy chatbot banking are the top choices. Chatbots enable customers to receive a quick and efficient service while simultaneously serving as a listening channel, helping banks to better understand user habits and deliver personalized products and services. Chatbots added a new dimension to banking communication that significantly pushed toward digital transformation. This paper will discuss the use cases of chatbots in the banking sectors. In addition to this, we will also discuss the futuristic potential of banking chatbots.

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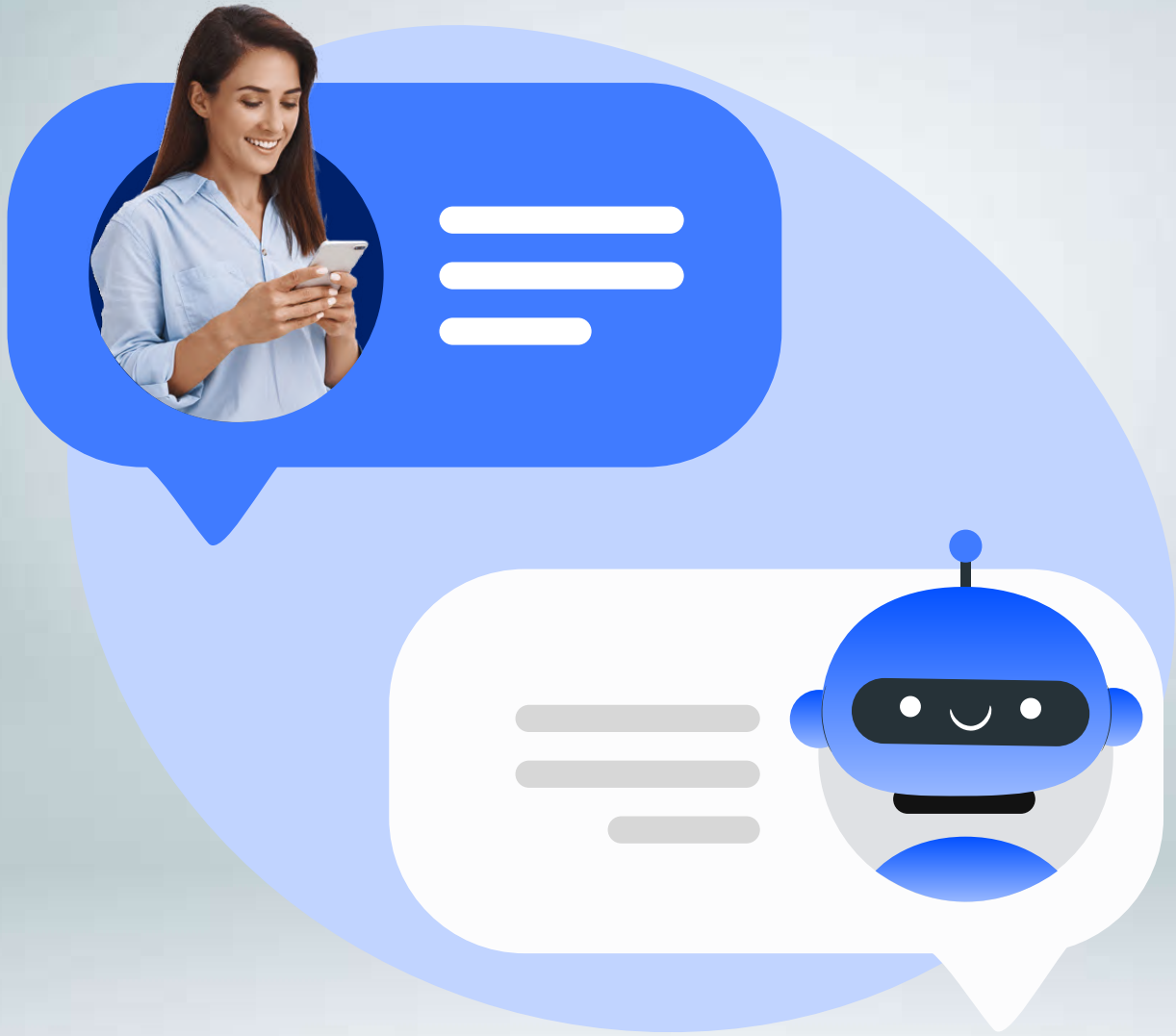
Chatbot Introduction

Impacts of Chatbot in Banking

In the era of the fourth industrial revolution, getting information within minimum time ensures business success, and this happens especially in the banking industry, where most of the service-related communications nowadays are conducted online. The global online banking transaction amounted to $11.43 billion in 2019 and is expected to grow to $31.81 billion by 2027 with a 13.6% CAGR (Allied Market Research, 2020). This requires an efficient communication system where customers can get the correct information in due time. But to make communication efficient, physical contact and paper-based information are significant limitations as it takes a higher time and cost. Using banking chatbots will stimulate customer engagement practices.

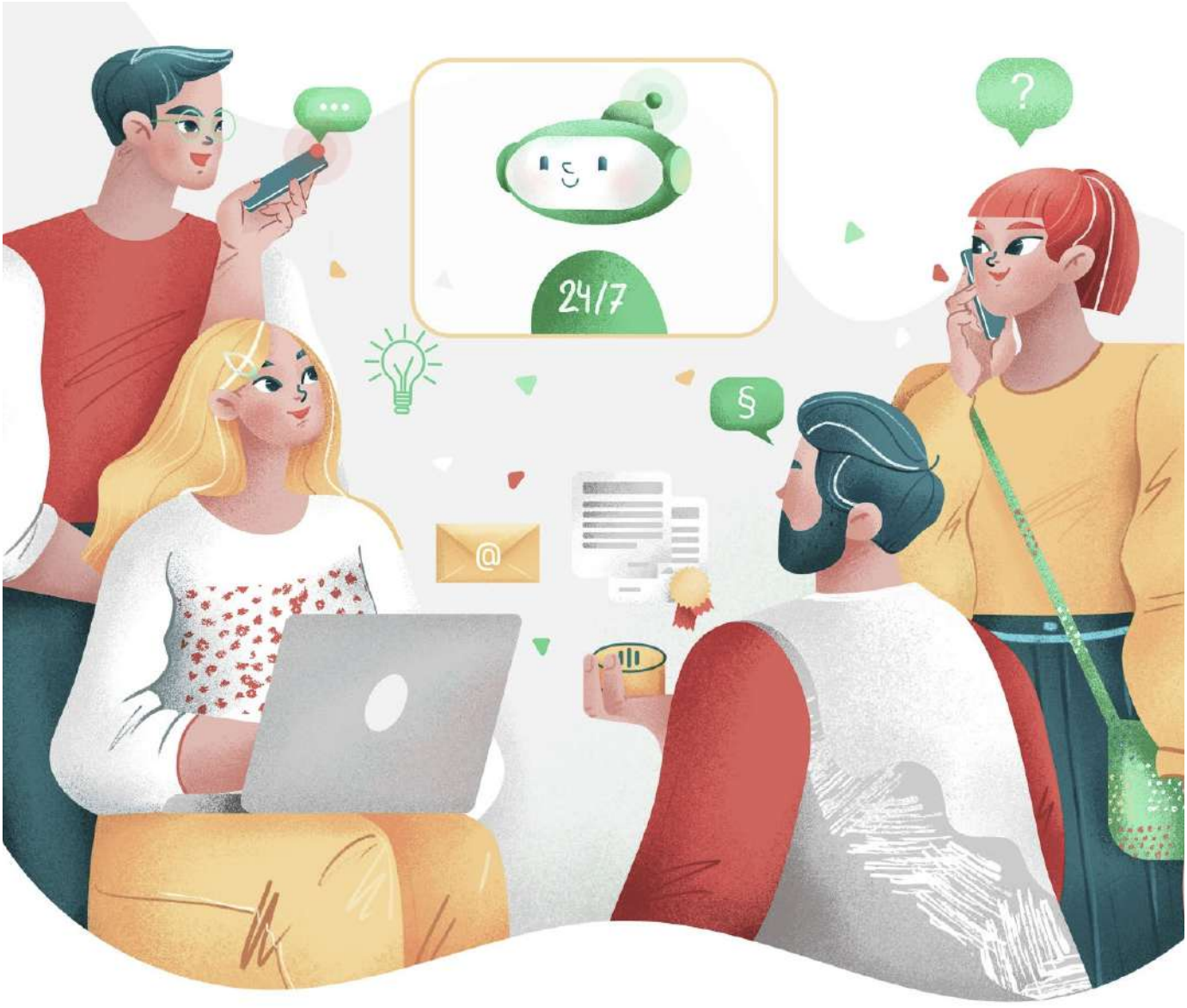
As a consequence, the bankers, as well as their clients, will be able to transact and communicate on a real-time basis. Belatrix shared that adopting chatbots and automation provide a 30% lower cost, 59% fewer waiting hours, and 43% reduced time on recurring services [3]. In fact, during the Covid-19 pandemic, when physical communication was strictly restricted, chatbot services through online platforms were unquestionable [13]. Chatbots become the change-maker in this new everyday life.

Moreover, serving all the customers face-to-face requires numerous banking personnel linked with high remunerations and training expenses. Juniper Research studied that banking chatbots will reduce operational costs by $7.3 billion globally by 2023 [10]. In addition, chatbots and mobile banking apps can provide 79% successful interactions in 2023 for chatbot-driven customer communication. Firstly, this paper aims to do an in-depth study regarding the present and future use cases along with the evolution, mechanism, and security system of banking chatbots. Secondly, it will discuss the current and future adaptation levels in the banking sector and suggest the banking practices that could be performed through chatbots.



02
Chatbot:
A Conversational Agent

What is a Chatbot?



Shih Chien University's Professor Sen-Tarng Lai and others broke down the word 'chatbot' as chat and robot [11]. A chatbot is a natural language conversational program through which users can have the appropriate responses like a human response. Jackson defined a chatbot that leverages artificial intelligence to simulate and process human interactions [8]. He also claimed that a chatbot pilot helps determine the best solution and refine the features needed to be most effective. In other words, a chatbot is a conversational program that stores correct responses to queries and follows AI-based natural language processing to produce the optimum response.

The present AI-driven chatbots result from the tremendous research and effort of developers.

Name	Short Description
Kuki Artificial Intelligence Chatbot	It also enhances its conversation skills with advanced machine learning techniques.
Google Dialogflow	Google Dialogflow is an advanced AI-based natural language understanding platform designed for the conversational user interface both in the forms of a chatbot and a voice bot.
Microsoft Azure Bot	Microsoft Azure Bot provides an integrated bot-building environment where you can create different types of chatbots for business.
Amazon Lex	Amazon Lex is an AI-powered conversational interface platform that allows the development of software applications with voice and text.
REVE Chatbot	While chatbots are created for performing certain actions on behalf of humans, REVE Chatbot is solely focused on customer communication. It's AI, bulk training options, and associated features make it a suitable chatbot for various industries and use cases.
Eviebot	Evie is a learning chatbot using the Cleverbot engine developed by Existor. They use Cleverbot to find customers for their services and solutions to generate leads.
Insomnobot 3000 Text Bot	Insomnobot 3000 is just the right amount of original, funny, and outlandish. It's a good example of conversation marketing and its viral potential.
Netomi	Netomi's deep reinforcement learning platform allows for conversational AI and chatbots that engage through personalized interactions at scale and one-to-one relationships throughout the entire user experience.
Engati	It is a no-code AI chatbot and a Live Chat platform to engage in real-time conversation to push business move forward.
IBM Watson Assistant	AI-powered virtual agent designed to provide customers with fast, consistent, and accurate answers across any messaging platform, application, device or channel
Kommunicate	Kommunicate is a customer support automation platform helping you build live chat and chatbots for your website

Table 1 presents some of the current chatbot landscape.

Model and Working Process of Chatbots

Some significant models and processes nicely shaped today's chatbot into a virtual assistant. Artificial Intelligence in chatbots continuously trains the conversation system with algorithms to perceive the user interactions for producing future optimum responses [6]. Within AI, deep learning mimics the human brain, which tries to find the correct patterns from the training data and uses the same design or model to process new data.

Machine Learning is an integral part of artificial intelligence, focusing on making decisions without the need for explicit programming. A neural network is a series of algorithms that recognize the underlying relationship in a data set and generate relevant and grammatically correct responses [1]. Chatbot uses a vital component called Natural Language Processing (NLP) tools for artificial intelligence.

NLP is a method of making the machine or computer understand the human language, and it is mandatory to enhance the quality of the conversation [12]. Bag-of-words: a model for documenting the classification where the occurrence of each word uses a feature for training a classifier. The generative Pre-Trained Transformer (GPT3) model can almost respond like human beings as it uses natural speech recognition to understand open-end questions [8]. Chatbots face problems recognizing voice inputs due to different accents of the same language. Even chatbots cannot handle sensitive information with emotions, which can increase the number of unsatisfied customers [3].

The effectiveness of the chatbot can be assessed using the Response Error Rate. Venkatesh et al. calculated the response error rate by dividing the number of incoherent responses by the total number of responses [17]. A hysterical response indicates the irrelevant messages delivered to questionnaires based on the last asked question. The efficiency of a chatbot can also be measured using a Turning Test which measures the chatbot's ability to produce a human-like response [16].

One of the best examples of a chatbot that can ensure a complete package of all the advanced technologies and models is MILABOT. It is developed by the Montreal Institute for Learning Algorithms (MILA) for the Amazon Alexa Prize competition. Combining the natural language generation and retrieval models, the system incorporated template-based models, bag-of-words models, sequence-to-sequence neural networks, and latent variable neural network models to provide appropriate responses [15].

03

Chatbot in the Banking Industry: The New Era of Communication

Radical Changes in Banking Sector

With the advancement of science and technology, the banking industry is undergoing a radical change that requires advanced technologies to provide services and communicate effectively. One-to-one phone calls with bankers are less desirable as it requires both time and cost. Moreover, it costs huge to train customer service agents for providing the right support to customers. This led to chatbot adaptation gradually in place of professional bankers.

In 2017, Chaitrali and others defined a chatbot as a conversational agent that interacts with users in a particular domain on a specific topic with natural language sentences [4]. Banking chatbots offer a competitive advantage by providing improved customer satisfaction through interactive virtual assistants [5]. The study proved that providing excellent services with technologies is possible through chatbots. Even in an outbreak and physically handicapped

situation, chatbots ensure a smooth banking business simply by having intelligent devices. Banking chatbots act as a smart guide on a website where a huge number of visitors can get useful information and support. With extreme market competition, banks are required to go for mass marketing with the help of an AI-based chatbot which is a dynamic process of providing information. Moreover, customers now feel more secure and flexible with chatbots instead of customer service officers because savvy customers do like emotionless and straightforward responses to typical bankers' marketing-orientated speeches. Chatbots can provide rapid responses to customers with more efficient access to banking information with the support of AI [4]. Greenberg emphasized adopting chatbots as a part of the overall customer engagement policy when a company experiences continuous growth in market share [6].

Sarbabidya & Saha (2020) concluded that chatbot-focused services ensure effective customer service, which leads to business growth. This happens due to easy access to personalized services with the minimum effort, increasing the customer's psychological bondage to the company. It is also found necessary to follow an advanced internal communication system to ensure adequate understanding among bank managers and employees (Shrestha et al., 2019)

04 Types of Chatbots

Purpose Perspective

Lead Generation, Customer Service, Marketing, HR, etc.

Lead Generation

Chatbots are specially trained for lead generation to create a base for the target customers by collecting fundamental information about their current status and future demand.

Customer Service

This chatbot is more effective where a large number of retail customers are required to serve frequently. Customers will be able to get self-service without wasting their time in the queue and asking similar questions.

Marketing

Chatbot as a digital marketer works on information sharing based on the client's query, prepares the pre-purchase formalities, and finally confirms the orders.

Finance

Organizations can take help from a finance chatbot to check balances, ask for future payment information, and manage investments based on maturities.

Human Resource Management

An HR chatbot improves the efficiency of the human resource team by hiring the right personnel, training them, assisting to follow changes in policies, and keeping real-time track of performances.

Production Management

Manufacturing chatbots are able to check inventory status, take and place future orders, and ship the ordered products as asked by the managers.

2. Channel Perspective

Social Media Like Facebook Messenger and Comments, Viber, Whatsapp, and Websites, Apps, Etc.

Facebook Messenger & Comments

The most common channel for chatbots is messenger where quick replies increase customer engagements and ready solutions.

Viber

Viber also added a feature for chatbot building. You can customize the bot based on the range of service coverage.

Twilio

Twilio Studio allows you to use chatbots for your customer attachments.

Skype

You can add a certified chatbot to your Skype account to build profitable and high-quality communication services.

Line

Line chatbot can be used for maximizing the opportunities for communication.

Telegram

Telegram also added a conversation partner service to boost your customer engagement.

WhatsApp

To provide customer support 24/7, you can use WhatsApp. Among the available channels, it can offer you the best features with advanced technologies.

Instagram

You can easily meet your communication goals with an Instagram chatbot. It will help you to support the customers better.

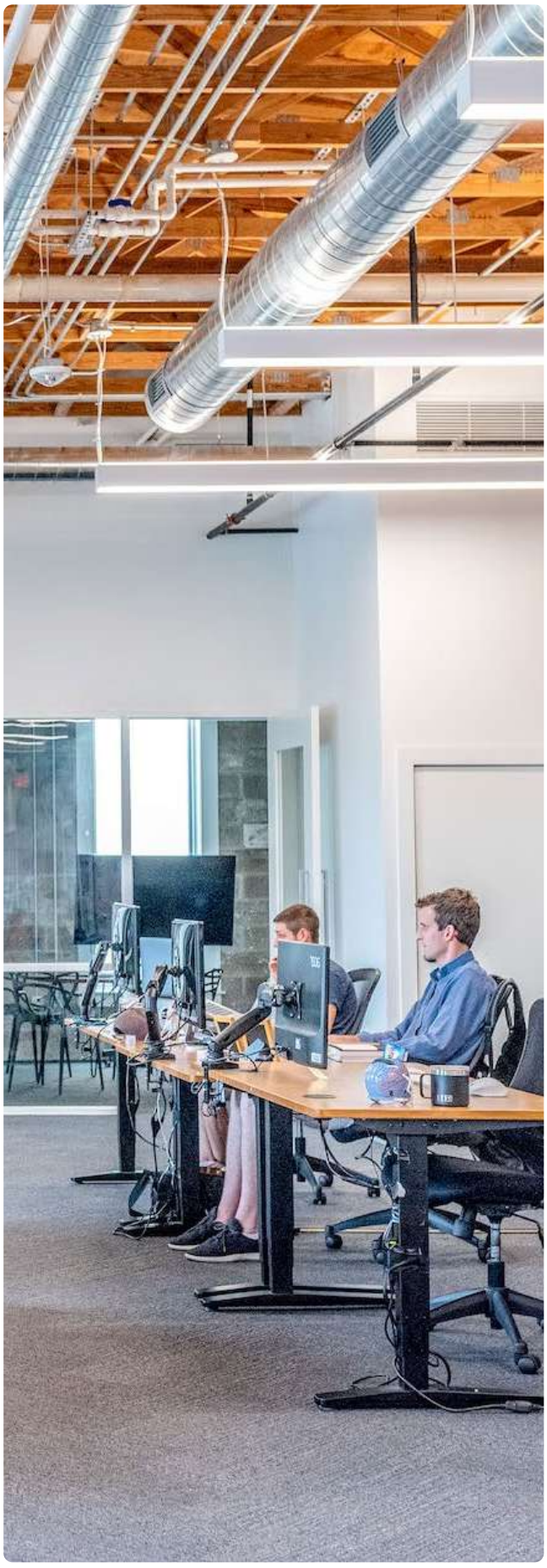
Website

Companies can leverage their business websites to integrate an AI-powered chatbot for providing faster customer service.

Mobile App

More than two-thirds of the world's population use a mobile phone. You can reach out to such a vast audience with a chatbot integrated with mobile SDK.

3. Industry Perspective



Banking and Insurance Chatbot

The most growing industry for chatbots is the financial sector, especially in banking and insurance services. A wide range of products and services can be offered to customers based on their needs and channelization of money from different parties can be done easily.

Tourism Chatbot

One of the most promising cases of chatbot usage is tourism. Chatbots assist clients by sharing information about tourist spots, booking flights and hotels for them, removing language barriers for easy communication, and making payments in local currencies when needed from attached accounts.

Health Care Chatbot

Chatbots as medical assistants help to find the right specialists based on customer's queries, schedule appointments with doctors, keep track of medicine dose and take feedback on the post-treatment status.

Education Chatbot

Chatbot are used in educational institutions to assist clients in the admission applications, enrollment process, semester fee payments, scheduling final examinations, access to results, and collection of certificates.

Transportation Chatbot

Any kind of transportation nowadays is highly competitive and requires effective communication with target clients. Such chatbots are very efficient in showing the available routes, booking journey dates, fixing prices, and managing luggage.

Real Estate Chatbot

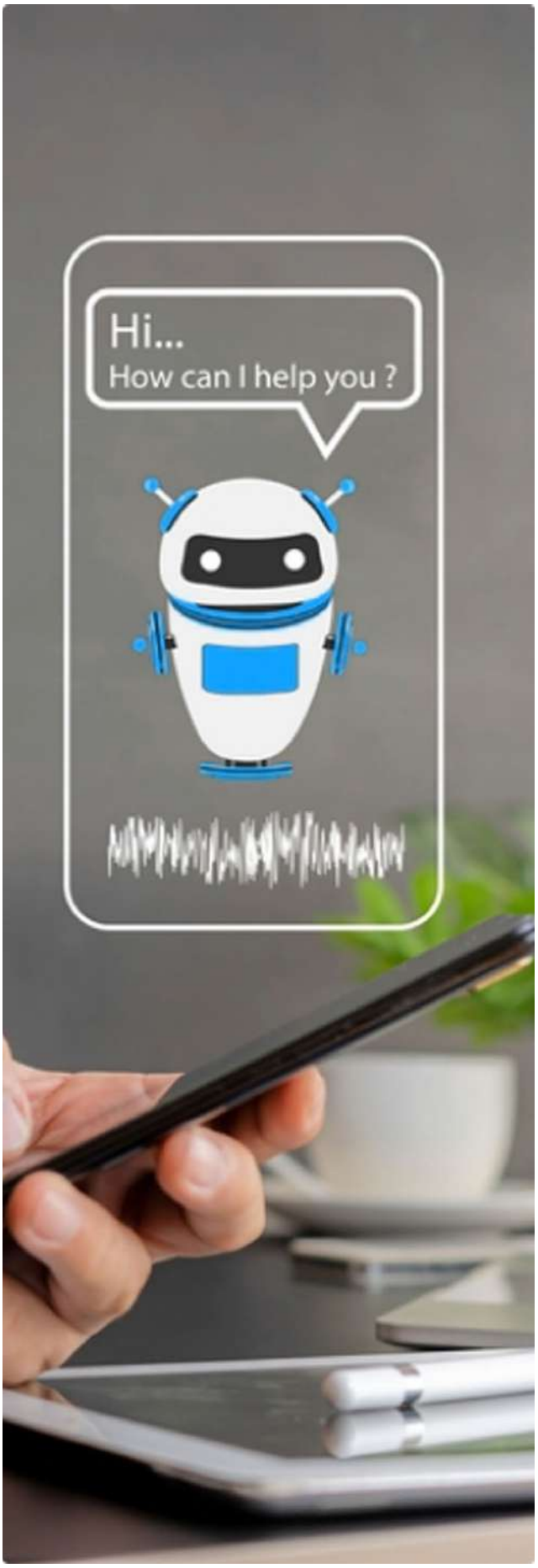
Buying, selling, and renting a house requires a lot of information on price, location, and other facilities. Chatbots help the clients finalize the deals after sharing photos and videos about the products. Hotels and motels are also using such chatbots nowadays.

Restaurant and Hospitality Chatbot

A chatbot that can keep a reservation system, display the available food menus, take advance orders and serve on scheduled time, customize spaces for celebrating parties, accept service reviews from customers and arrange the delivery.

eCommerce Chatbot

The covid-triggered neo-normal has made people accustomed to buying online. Hence, the eCommerce sector has seen a tremendous rise in all aspects. Serving a large number of customers is a real challenge for eCommerce businesses, where a chatbot is an ideal solution.



4. Way-of-Use Perspective

Voice, Non-Voice

Non-Voice

A chatbot that can only take queries and reply using texts and images. The most common type of chatbot used is text-based chatbot.

Voice

A chatbot that uses speech recognition technologies to convert it into text, produces replies in text, and delivers in verbal speech is called a voice-enabled chatbot.

5. Technical Perspective

1. Rule-Based 2. AI-Based 3. Hybrid

Watson (2017) mentioned two alternatives for the development of chatbots. Firstly, a system following a mechanism like a tree diagram is called a rule-based approach. Secondly, an AI-based system follows past responses to generate the appropriate feedback. Hwang & Kim also classified a retrieval model and a generative model [7]. The rule-based model delivers predetermined answers based on a specific query, and the generative model offers personalized responses based on deep learning methods. In terms of cost and capabilities, Jackson classified four options to guide the choice of chatbots [8].

Knowledge-Based

A question-and-answer pairing method is constructed from the Frequently Asked Questions (FAQ), which can provide only specific responses for every known question. The process follows a limited reaction based on the set of questions. However, this knowledge-based chatbot is still convenient as it can meet a specific need with a linear response.

Rule-Based

It is also called the classical approach, as it follows predefined rules to generate responses. This fixed repository of responses uses decision tree models to navigate the user through multiple layers of content. In general, chatbots offer the user a choice with buttons to move forward or go back and make a close-end conversation. This type of chatbot is best fitted where it can handle the domain-specific orders.

Hybrid

Neural network application in chatbots has broken down the boundaries of exploring the solution from large datasets; instead, it can generate new answers following a specific prediction model between the feature of the question and the output class or value of the response.

Conversational

Conversational chatbots ensure the most appropriate responses with the help of machine learning and natural language processing. AI technologies convert the previous satisfactory answers into a knowledge base for future responses. Deep learning methods improves the accuracy of new replies through self-valuation.

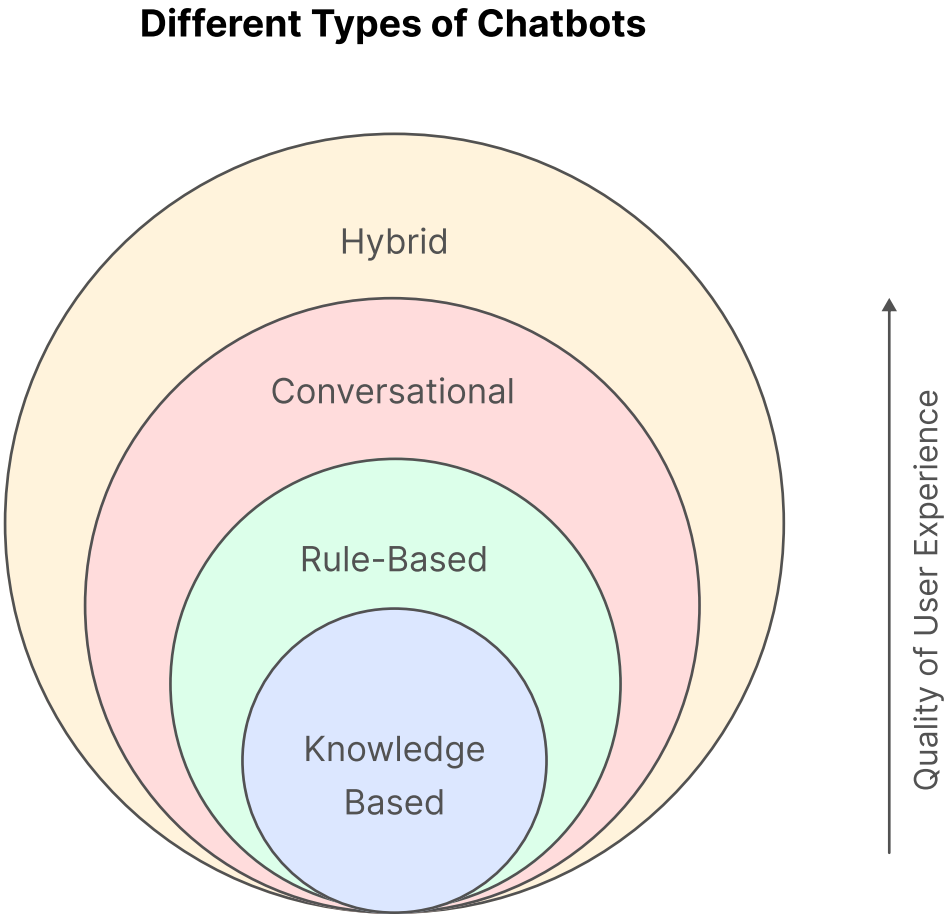
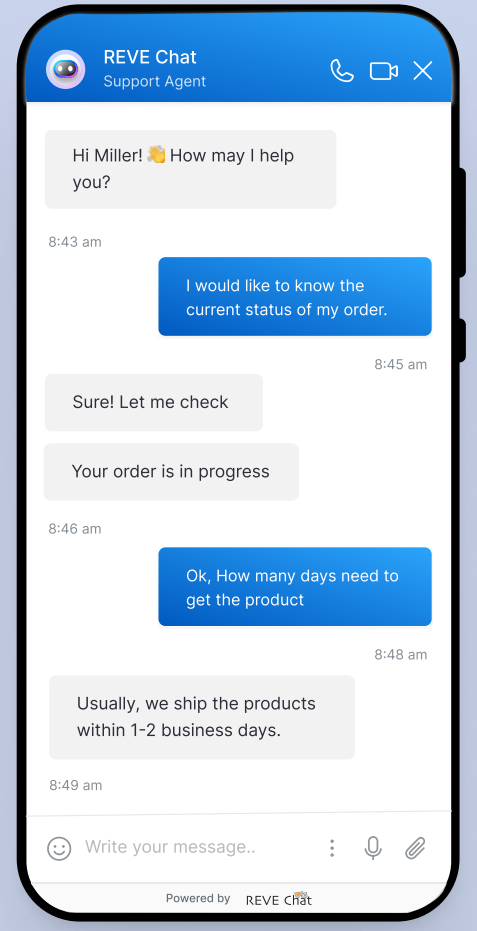


Figure 1: Different Types of Chatbots

05

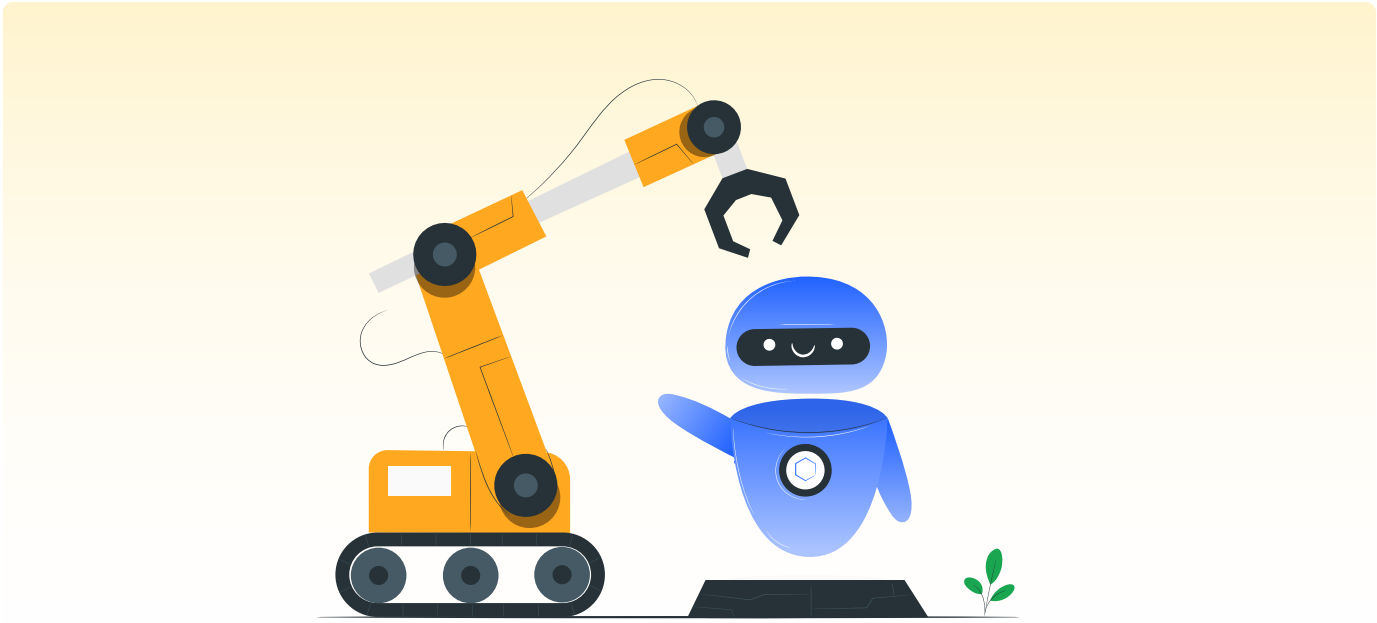
Mechanism Behind Chatbots

Chatbot Mechanism is Vital for Accurate Response



Mohit Jain, Principal Researcher at Microsoft Research Lab India (2018) studied chatbot users and found that users expect chatbots to perform the core functions and have a good interface and conversational intelligence. However, Eren (2020) found that customer satisfaction with chatbot usage depends on perceived performance, trust, and corporate reputation. On top of this, Dung Nguyen, Senior Full-stack Developer of Zukitek Vietnam examined that users' intention to continue is greatly dependent on information quality, system quality, service quality, and confirmation of expectation [13]. The mechanism of the chatbot should be excellent in providing quality responses. Ultimately, users always prefer to communicate with high-performing, usable and reliable conversational assistants irrespective of design and type.

Process of Designing and Developing a New Chatbot



Determine the Goals and the Tasks

In the beginning, the chatbot designer needs to set the specific objectives of the chatbots. Establishing a chatbot is to develop the task that the chatbot could conduct. To what extent the organizer expects that the developed chatbot can serve is the essential determining factor in this initial stage. The customer service officer can obtain the best possible answers and provide a list of consistently asked questions with a categorization. Based on the suggested questions, the developer needs to find out the most suitable and reliable answers. In contrast, one can put himself in his customers' shoes and brainstorm the possible services a customer will look for using the online Chatbot platform. It is even suggested to confirm the input and output method like text or voice at the very initial stage so that the developer can choose to organize the system based on the requirements.

Architecture - Mapping the Journey

As prescribed in the objectives, the developer will construct a mechanism through which the whole process will perform. To start with, developers need to design the conversation by identifying the initial and follow-up questions. The chatbot must generate the appropriate responses and record the most satisfying answers for future uses. With AI technologies, chatbots can learn and explore the best possible solutions.

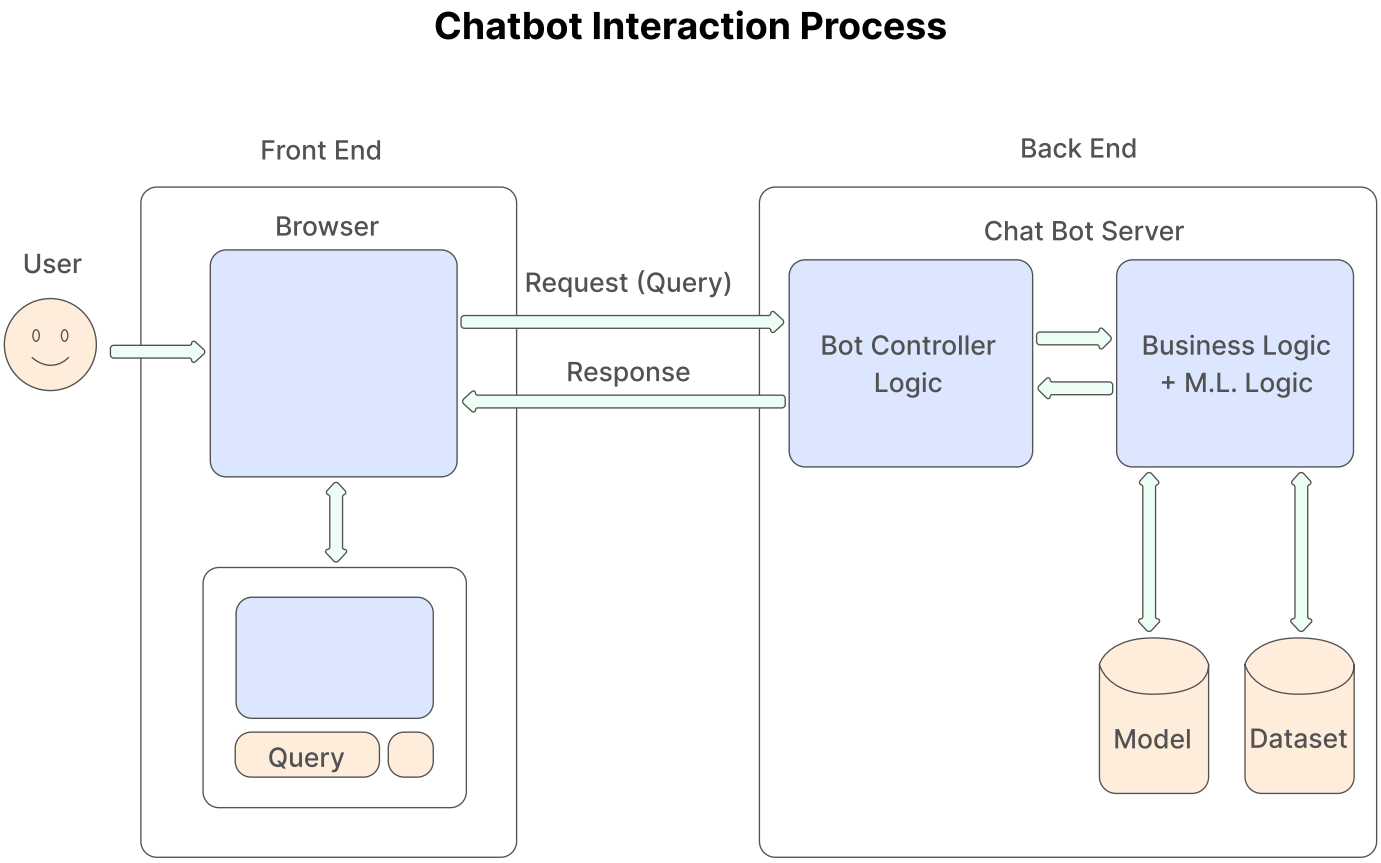


Figure 2: Chatbot Interaction Process [4]

The whole process is depicted in Figure 2, where users input the query on the front end, and the response will be generated on the back end using a chatbot server. The bot controller logic handles the requests and responds to those. With the support of Natural Language Processing and machine learning techniques, business logic tries to recognize the input and converts it into a machine-understandable format [4].

Integration

Chatbots need to be smarter with the passage of time to serve the users at their best. The developer will start with a prototype where he will put the input-output system as simply as possible. The focus will be given on whether they can generate the correct responses based on asked questions. The prototype must undergo massive and dynamic trainings to recognize and filter the necessary data. In this stage, the technical and operational feasibility must be assessed. The integration is considered to be successful when the chatbot serves the stakeholders' needs using the pre-fixed channels and platforms.

Test and Refine

As successful chatbots are one of the determining factors of customer satisfaction, thorough and continuous testing will be required. Developers should invest their time in assessing the performances step by step. For testing, they can invite both internal and external users of the developed chatbot. Collected feedback needs to be documented so that modifications can be carried out where the conversation fails. The irrelevant responses will generate log files. The developer will provide the correct answer based on class and retrain the classification model (Chaitrali Dangare, Assistant Professor at BEIT, 2017). Refinement should continue until the chatbot can successfully offer accurate solutions to the user's query.

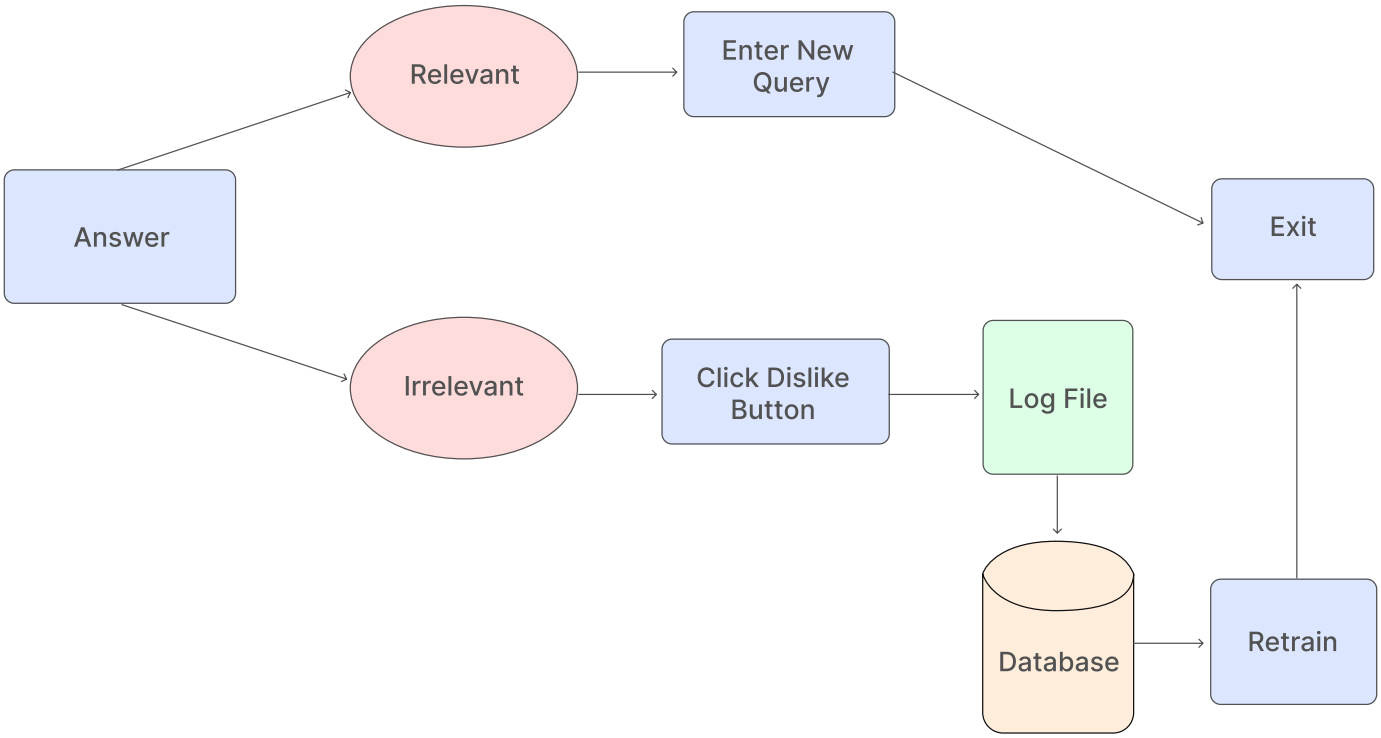


Figure 3: Chatbot Refinement Process [4]

Still, Belatrix suggested a few major determining factors to consider before launching a conversational agent [3]; Firstly, chatbots should be customer-oriented, which requires tremendous research to point out what the users are demanding as a query. Secondly, based on the findings, an organization needs to confirm the types of chatbots that can satisfy the customers completely. Thirdly, an organization needs to search for additional features included in the chatbot to provide simultaneous services. Fourthly, chatbots must ensure data privacy and security for both parties, especially for financial assistance. Finally, the chatbot should undergo continuous trainings to provide satisfactory performance.

06

How Chatbots are Ensuring Security in the Banking Sector

Importance of Chatbot Data Security

It is already proved that chatbots work as a critical factor for business growth and the development of online banking. But significant security concerns arise while dealing with sensitive information for virtual communication. In search for an answer, Sen-Tarng Lai, Dept. of Information Technology and Management, Shih Chien University found that Chatbot Security Control Procedure (CSCP) reduces the security risk and protects data privacy [11]. If the chatbot mechanism is wrongly coded, it can bring unmeasurable losses to both the banker and it's customers.

Hence, They Designed CSCP in Four Phases as Below

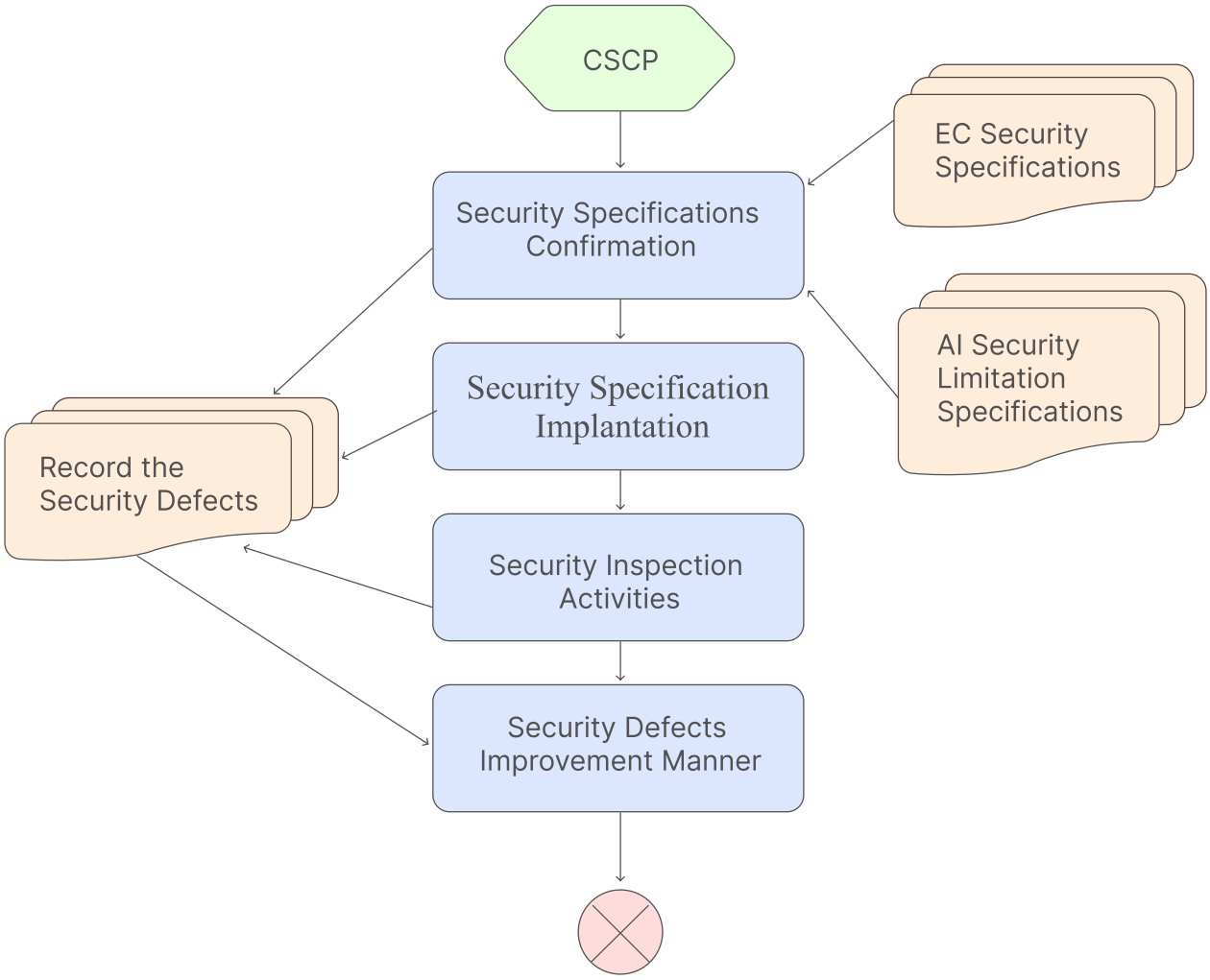


Figure 4: Phases of Chatbot Security Control Procedure [11]

Chatbot Data Security Procedures

PHASE 01

Security Specifications Confirmation Control: An effective chatbot security mechanism must follow the eCommerce (EC) security strategies and AI security principles. The eCommerce or e-banking security specifications confirm that data access, data usage, and data transfer are grounded on security strategies and defects recorded. Whereas the AI security limitation specifications guarantee knowledge-based, machine learning and information search are grounded on limitations specifications, record inconsistency and security defects.

PHASE 02

Security Specification Implementation: The second phase ensures that the chatbots implement the prescribed EC and AI security principles. If the directions are not fulfilled, the content must be recorded for future perfection.

PHASE 03

Security Activity Inspection: This phase inspects whether the compliance levels are satisfactory or not. If the chatbot cannot ensure proper security specifications, the system will record it for subsequent improvements.

PHASE 04

Security Defects Improvement: This last phase accumulates all the previously recorded defects and scrutinizes the reasons behind such discrepancies. After analysis, it suggests actions for security improvements to avoid the same type of defects.

07

How Tech-Forward Banks are Using Chatbots in the Current World

Leading Banks Using Chatbots

New generation customers are game-changing customers for the banking business. Monika-Anetta Alt, Associate professor at Babeș-Bolyai University found that higher perceived compatibility of the customer is the primary force to adopt chatbots as it supports how chatbots fit well with his daily lifestyle [2]. In addition, the perceived usefulness of chatbots is another essential factor for adaptation. Though financial companies are furiously investing in AI, transformation and acceptance require reasonable time and customer confidence [7]. Moonkyoung Jang, Assistant professor at Gachon University examined the Korean banking industry to explore bankers' perceptions regarding chatbots to know the current and future adaptation [9].

They used content analysis and core-periphery analysis and concluded that managers are positive towards chatbots but need to enhance customer experience, operational efficiency, and organizational capability.

Some of the largest banks in the world that adopted chatbots to streamline their operations are Bank of America (Erica), JPMorgan Chase (COIN), Capital One (Eno), and Royal Bank of Scotland (Luvo). Even in the neighboring country of India, banks are aggressively investing in chatbots and virtual assistant technology, though with a narrow range of services [14]. Mobile Financial Services (MFS) has also started leveraging chatbots for various use cases. bKash, a unicorn MFS brand that is ranked 23rd on Fortune's third annual 'Change the World' list, added an advanced AI-powered chatbot to its platform.

Present Use Cases of Banking Chatbots

Customer Support on the Go

Customers can access the information system, and there are multiple ways to instruct for appropriate feedback. The 24/7 availability will boost the banking business and win customer loyalty through personalized experiences.

Retrieving Information

Chatbots can provide the client's account details based on demand. By giving the correct information about the account, customers can also have their mini account statement.

Ticketing System

In case of any complaint, a chatbot can issue a ticket number for that complaint and provide the task's current status.

Finding the Location of Nearest ATM

By sharing the current location of the users, chatbots can suggest and direct to the possible nearest ATM and branches of the respective banks.

Assisting in Opening a Bank Account

One of the most suitable facilities that most chatbots can provide is opening a bank account with ease. Nowadays, banks allow customized accounts to offer smooth services and these customized services can be easily communicated through banking chatbots.

Transferring Money

Customers do not need to wait in a queue any longer as they can transfer money by themselves with the help of AI-based chatbot system.

Mobile Recharge

Using the account balance, anyone can recharge their mobile. Even cards can also be used to provide instructions.

Forex Services

The client can ask for the current spot rate for different foreign exchange rates and transact using their own account balances.

Customer KYC

As per the central bank's guidelines, each customer must update their KYC (Know Your Customer) form. For customer convenience, e-KYC is introduced where they open an account by filling up a digital form, taking photographs on the spot, and authenticating the customer's identification data instantaneously. In addition, biometric data and digital signatures also help future transaction authentications.

Handling Appointment

Online banking facilities can cover more than 80% of banking services. Yet few services need the customer's physical appearance for clarification, negotiation, and documentation. Customers can schedule a suitable time with the authorized handling banker to reduce waiting time and conduct pre-processing activities.

Bill Pay Alert

These chatbots can provide alert services and send reminders at the mentioned time through different messaging apps.

Credit Card Application and Activation

The bank's existing client can immediately ask for a credit card through the chatbot by providing the account details and preferred card category. As it takes a few days for the bank to process and print the card, the customer can check the application status by asking the chatbot. After receiving the card, it further requires the activation process when the chatbot can help the customer by sharing the information.

Fraudulent Activity Alert

Through an AI-based chatbot, it can easily detect any fraudulent effort conducted by anyone else other than the right person; an AI-based chatbot can send quick alert messages to the right person over SMS, email, WhatsApp, or messenger. In advanced cases, it can provide a resolution for more account securities.

Report Stolen Card

In case of reporting any lost or stolen card, clients do not need to write in a paper application; they can communicate with the bank through a chatbot which is the simplest way for reporting.

Handling HR Activities

The HR team can carry out their routine operations with minimum effort and time. In addition, newly joined employees can use chatbot as their corporate buddy or initial trainer. They can easily get help with their needs and ask any questions without hesitation.

Get Weekly & Monthly Spending Report

The debit and credit card holders can get their weekly and monthly spending reports by asking the chatbots.

Loan Application Processing

The willing customers can access all the loan product details by simply asking the chatbots. It will specifically suggest the correct type of loan for the customer with proper instructions. If the client is convinced, the chatbot can create an online loan application to the bank's portal, and the customer can see what further is required to get the loan.

Providing Service in a Conversational Way

Customers will get the desired services and information within a reasonable time as they don't have to wait for available agents. They can ask their queries and get information through these conversational interfaces.

Personalized Conversation

With the advancement, chatbots can remember each customer's previous queries and respond accordingly just like we can do with human service providers.

Check & Redeem Reward Points

Many banks offer their customers reward points based on type and volume of transactions which can be used later for particular products or offers. Through chatbots, customers can track their earned reward points and redeem them as per their requirements.

08

What Else Chatbots Can Do for Banks - Future Use Cases

Future Use Cases of Banking Chatbots

Sharing Information Among Banks

Nowadays, chatbots only follow the data provided by their respective banks. In the future, compliance and regulations provided by the central bank will be tracked and ensured while rendering services to customers through chatbots. For example, customers can ask the chatbots about the current and updated central bank's prescribed guidelines regarding any issue. In addition, in case of a transaction with another bank's customer, it will be smooth and reliable if the chatbot can confirm that the beneficiary account number and name are matched.

Introduction to Unit Banking and International Banking System

We can go for a centralized banking system where banks can offer digital services to every customer regardless of location. This will improve the bank's efficiency by requiring fewer employees to provide the services. With the help of chatbots, it is possible to introduce a unit banking system instead of the existing branch banking system. Moreover, international banking services will be available as the digital banking system follows 24/7 model.

Face and Voice Recognition

With the help of e-KYC, customer's biometric data like face and voice can be stored and used in case of authentication when required. A chatbot will not inquire for further verification about who is the instructor to have access to the sensitive information. This can increase the trustworthiness of the service provider as the amount of error or fraud will be reduced.

Improvement in Sentimental Analysis

To make a conversation more effective, chatbots need to improve their responses to sentimental and emotional queries. Being straightforward with delivering sensitive information can bring opposite results in satisfying the customers.

Dynamic Bots

Some responses are not satisfactory with long text or complex sentences. In such cases, voice bots and graphical visualization can assist the users of banking chatbots. Even in emergency and critical cases, the human touch will accelerate the performance of communication with live chatbots.

Multilingual Chatbots

Most of the chatbots use English as the medium. But people love and feel comfortable chatting in their native languages. Developing and training the chatbots for multilingual conversation will increase acceptance. Chatbots can use the user's location to identify the native language and offer to choose his preferred language for communication.

Loan Appraisal for Retail Banking

The existing chatbots can share the required information for a loan, take and process the loan application and provide the current status of the application. Still, the loan assessment process is conducted manually. But with the help of an AI-based chatbot, it is possible to assess the customer's creditworthiness by asking several questions to low-risk customers in retail banking. It will be advantageous to both the bank the customer as less time will be required for processing and decision-making.

Advanced Personalized Conversation

Blockchain in Payment System

A recent and effective development in information and communication technology is the blockchain which stores a chain of transactions that are very transparent. Any kind of payment through a chatbot using a blockchain system will ultimately increase the confidence of the users as it is going to be recorded in a standardized method.

Stay Ahead in the Competitive Edge With Chatbots

Artificial intelligence based effective communication leverages operational efficiency in providing better customer service. Chatbots change the dimension of banking facilities so rapidly that it is possible to replace physical banking with digital banking entirely in the coming days. But, a huge budget is required for rapid innovation with continuous upgrading and a flexible management strategy to adopt a technology-based service delivery system. Many studies revealed that the investment would return more in later days as ongoing development can create new products and merge existing ones. Considering all the discussed usage of chatbots, this paper concludes to adopt conversational programs immediately to get a competitive edge in the coming age. Though instant responses may come from young generations, it has been proved that aged customers' intention to continue using chatbots took reasonable time. For the banks, it is high time to go for artificial intelligence and automation with a variety of services. Bank managers can initially start with a rule-based model, which provides the most convenient interface to deal with. With time and the continuous development process, AI-driven chatbots can bring complete digital transformation to the banking sector.

1. Agarwal, R., & Wadhwa, M. (2020). Review of State-of-the-Art Design Techniques for Chatbots. In SN *Computer Science* (Vol. 1, Issue 5). https://doi.org/10.1007/s42979-020-00255-3

2. Alt, M.-A., Vizeli, I., & Săplăcan, Z. (2021). Banking with a Chatbot – *A Study on Technology Acceptance. Studia Universitatis Babes-Bolyai Oeconomica*, 66(1), 13–35. https://doi.org/10.2478/subboec-2021-0002

3. Belatrix. (2020). *The chatbot revolution.* https://cdn2.hubspot.net/hubfs/5078049/Media_files/Whitepaper_The_chatbots_revolution.pdf

4. Chaitrali, K., Amruta, B., Savita, P., & Prof. Satish, K. (2017). BANK CHAT BOT – An Intelligent Assistant System Using NLP and Machine Learning. *International Research Journal of Engineering and Technology* (IRJET), 04(05), 4.

5. Doherty, D., & Curran, K. (2019). Chatbots for online banking services. *Web Intelligence,* 17(4), 327–342. https://doi.org/10.3233/WEB-190422

6. Greenberg, P. (2018). Chatbots: Conversation for all of us. *Pitney Bowes White Paper.*

7. Hwang, S., & Kim, J. (2021). Toward a chatbot for financial sustainability. *Sustainability (Switzerland)*, 13(6). https://doi.org/10.3390/su13063173

8. Jackson, R. (2021). Benefits of a Chatbot Pilot Program. 1–15. www.govwebworks.com

9. Jang, M., Jung, Y., & Kim, S. (2021). Investigating managers' understanding of chatbots in the Korean financial industry. *Computers in Human Behavior,* 120(July 2020), 106747. https://doi.org/10.1016/j.chb.2021.106747

10. Juniper Research. (2019). *Bank Cost Savings via Chatbots to Reach $7.3 Billion by 2023.* https://www.juniperresearch.com/press/bank-cost-savings-via-chatbots-reach-7-3bn-2023

11. Lai, S. T., Leu, F. Y., & Lin, J. W. (2019). A Banking Chatbot Security Control Procedure for Protecting User Data Security and Privacy. In *Lecture Notes on Data Engineering and Communications Technologies* (Vol. 25). Springer International Publishing. https://doi.org/10.1007/978-3-030-02613-4_50

12. Nagarhalli, T. P., Vaze, V., & Rana, N. K. (2020). A Review of Current Trends in the Development of Chatbot Systems. *2020 6th International Conference on Advanced Computing and Communication Systems, ICACCS 2020,* 706–710. https://doi.org/10.1109/ICACCS48705.2020.9074420

13. Nguyen, D. M., Chiu, Y. T. H., & Le, H. D. (2021). Determinants of continuance intention towards banks' chatbot services in Vietnam: A necessity for sustainable development. *Sustainability (Switzerland),* 13(14), 1–24. https://doi.org/10.3390/su13147625

14. Pal, S., & Singh, D. (2019). Chatbots and virtual assistants in Indian banks. *Industrija, 47(4),* 75–101. https://doi.org/10.5937/industrija47-24578

15. Serban, I. V., Sankar, C., Germain, M., Zhang, S., Lin, Z., Subramanian, S., Kim, T., Pieper, M., Chandar, S., Ke, N. R., Rajeshwar, S., de Brebisson, A., Sotelo, J. M. R., Suhubdy, D., Michalski, V., Nguyen, A., Pineau, J., & Bengio, Y. (2017). *A Deep Reinforcement Learning Chatbot.* September. https://doi.org/10.48550/arXiv.1709.02349

16. Suhel, S. F., Shukla, V. K., Vyas, S., & Mishra, V. P. (2020). Conversation to Automation in Banking through Chatbot Using Artificial Machine Intelligence Language. *ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions),* 611–618.

17. Venkatesh, A., Khatri, C., Ram, A., Guo, F., Gabriel, R., Nagar, A., Prasad, R., Cheng, M., Hedayatnia, B., Metallinou, A., Goel, R., Yang, S., & Raju, A. (2017). On Evaluating and Comparing Conversational Agents. *Conversational AI Workshop at the 31st Conference on Neural Information Processing Systems, NIPS 17,* 1–10. http://alborz-geramifard.com/workshops/nips17-Conversational-AI/Papers/17nipsw-cai-evaluating_conversational.pdf

REVE Chat: A Smart Customer Communication Platform

REVE Chat is a customer communication platform that unifies and simplifies all communication between a business and its customers.
As a business, you have scattered audiences across Website, WhatsApp, Facebook, Viber, App, and more. You can communicate with them in a more efficient way with the help of REVE Chat.

While our chatbot can automate customer support and engagement, the live chat solution can help you take it to the next level in terms of personalization with a human touch. The robust platform helps you from lead generation to customer satisfaction.

Our Offices

Singapore
Corporate Head Quarter
REVE Chat, WCEGA Tower, 21 Bukit Batok Crescent, Unit 15- 84

Bangladesh
Development Center
REVE Centre, Plot-94, Purbachal Express Highway, Dumni, Khilkhet, Dhaka, Bangladesh.

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