

NAVIGATING CUSTOMER CARE USING ENTERPRISE CHATBOT PLATFORMS

"By 2020, the average person will have more conversations with bots than with their spouse"

- Gartner



The year 2019 is set to become the year of the chatbot, and the IT industry is gearing up to adopt the technology on an industrial scale. Chatbots are revolutionary pillars in the business as well as consumer domains with a huge market potential. It can be gauged from the momentum of industry leaders such as Facebook, IBM, Amazon, Google, and Microsoft who are leading the chatbot revolution and have either publicized their messaging platforms or have introduced chatbot building platforms in the market.

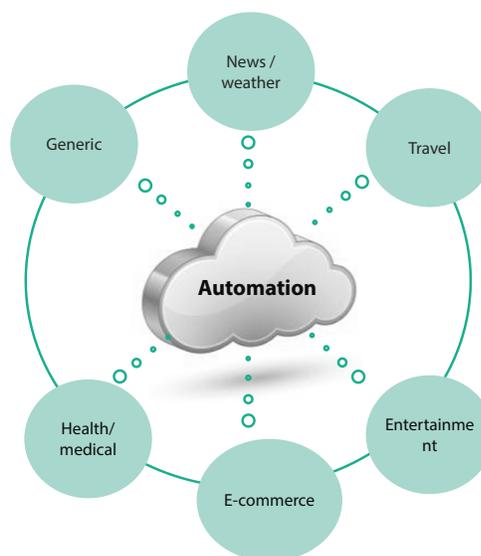
In this white paper, we focus on chatbot platforms and their usage, both from domain and technical perspectives. For the former, we have explored sample use cases where chatbots will benefit both business

and end users. Similarly, for the technical perspective, we have showcased a chatbot framework evaluation and provided an illustrative reference of the technical architecture that can be leveraged to build an in-house / custom chatbot framework, considering build vs buy factors.

We have also demonstrated a DevOps lifecycle use case that we have worked on, where we installed a chatbot system for a client's project to automate redundant and time-consuming build workflows without human intervention. It not only accelerated the entire continuous integration and continuous deployment (CI and CD) lifecycle but also significantly reduced operational costs.

Business benefits of chatbots

Every business wants to adopt the latest technology solutions to reduce operational costs, offload routine and time-consuming tasks, and focus on growth. Operational costs can be reduced only when the associated tasks can be performed more efficiently in less time with little or no human intervention, thereby reducing the need to maintain specialized teams. Following diagram depicts the multiple industries, where technology helps to automate these tasks through virtual personal assistants or chatbots or robotic process automation.



What we observed

Facebook and Google are focusing on implementing generic bot applications which can understand end user queries and provide meaningful service. These bots lack domain expertise which makes them unsuitable for enterprise adoption where contextual information is very important. Organizations are now focusing on developing specialized bots which provide domain knowledge to achieve multiple tasks and promote automation.

Some of the bot categorizations in the market include:

Categories	Bots
Generic	Google Assistant, Microsoft Cortana, Amazon Alexa, Apple Siri
Enterprise bots	Hubot, BugBot for Cisco Spark, Stockbot for Slack, notification bot for Twilio, Kudi, VerbalAccess, Talla, ChatOps
News / weather	CNN, Uber, Yahoo
Travel	Kayak, Hipmunk, Skyscanner, Expedia
E-commerce	WeChat, Shopify Messenger, Sephora, 1-800-Flowers
Health / medical	GYANT, Dr A.I., Florence, Forksy



Usage of Chatbots

The chatbot ecosystem is developing rapidly with specialized chatbots being created to address user needs in various sectors.

Marketing & Sales

Enterprises, global brands and small scale startup companies are creatively using AI powered chatbots to promote their business, to increase the sales and to

support the customers more efficiently. Bots can be part of their marketing initiatives and this will push the customers seamlessly through sales funnel. Business owners can benefit out of this as follows.

- Expand business by placing bot apps on Facebook Messenger, Slack and other messaging platforms that reach a wider audience.
- Personalized customer experience
- Improved customer relationships
- 24/7 availability to boost business
- Win customer loyalty and become a channel to market products
- Leveraged in marketing strategies to increase the company's sales actions
- Improve business through prompt query response times, increased efficiency, and more conversions, leading to more sales and higher revenue

Financial service

Banks can automate operational processes by adopting artificial intelligence (AI), which results in cost reduction and faster turnaround time. Some of the reasons why chatbots are becoming popular in financial institutions include:

- Conversations about investments and loans that apps were unable to handle can be smoothly managed by bots

- Ease of use for customers
- Automated data gathering
- Bots can be used to introduce new products and services to customers and test the user's interest level in specific products

The next phase of digital banking will be ushered in by artificial intelligence capable of thinking and acting on behalf of users

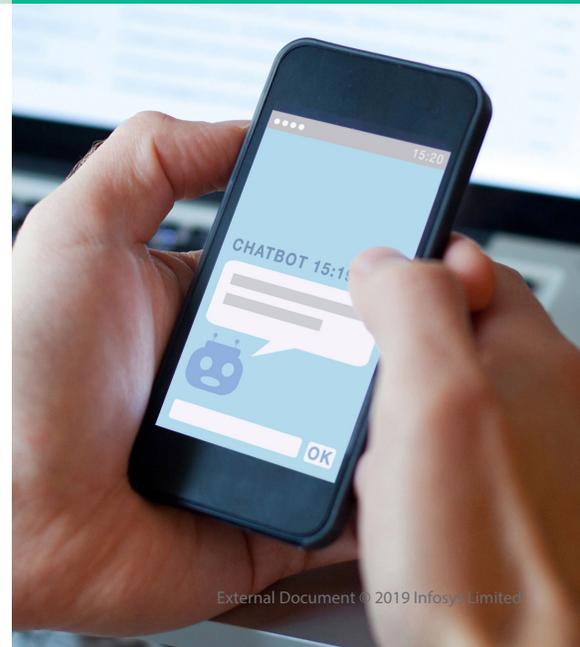
Some of the largest banks in the world are adopting chatbots to streamline their operations:

Banks	Chatbot
Bank of America	Erica
JPMorgan Chase	COIN
Capital One	Eno
Royal Bank of Scotland	Luvo

Human Resources (HR)

Conversational AI is making HR more effective and agile by changing the routine way of performing HR processes and functions. Automating these processes will provide the ability to spend less time on Operational issues and utilize more time on strategic and pressing elements of HR department, this will increase the productivity of the team. Chatbots will be very effective in some areas of HR as follows.

- Onboarding a new employee process can be automated and streamlined using Conversational AI
- Scaling is huge issue in recruiting space for the HR, Chatbots will simplify this process by interacting with applicants, getting required information from them and also answer multiple applicants FAQs simultaneously in real time
- HR trainings are very effective using Conversational AI as this has more interactive participation rather than sit and watch standard training videos



Customer service

Chatbots and machine intelligence software are becoming popular as business enterprises automate their customer support services and sales in order to minimize costs without affecting the customer experience. A positive customer service is essential to reinforce a brand's reputation. Consequently, several customer

service organizations are turning to conversational Artificial Intelligence for enhanced customer service.

- Chatbots never sleep, a cost-efficient and powerful way to provide 24/7 support
- With chatbots, customers no longer have to wait for the next available agent

25% of customer service operations will use chatbots by 2020

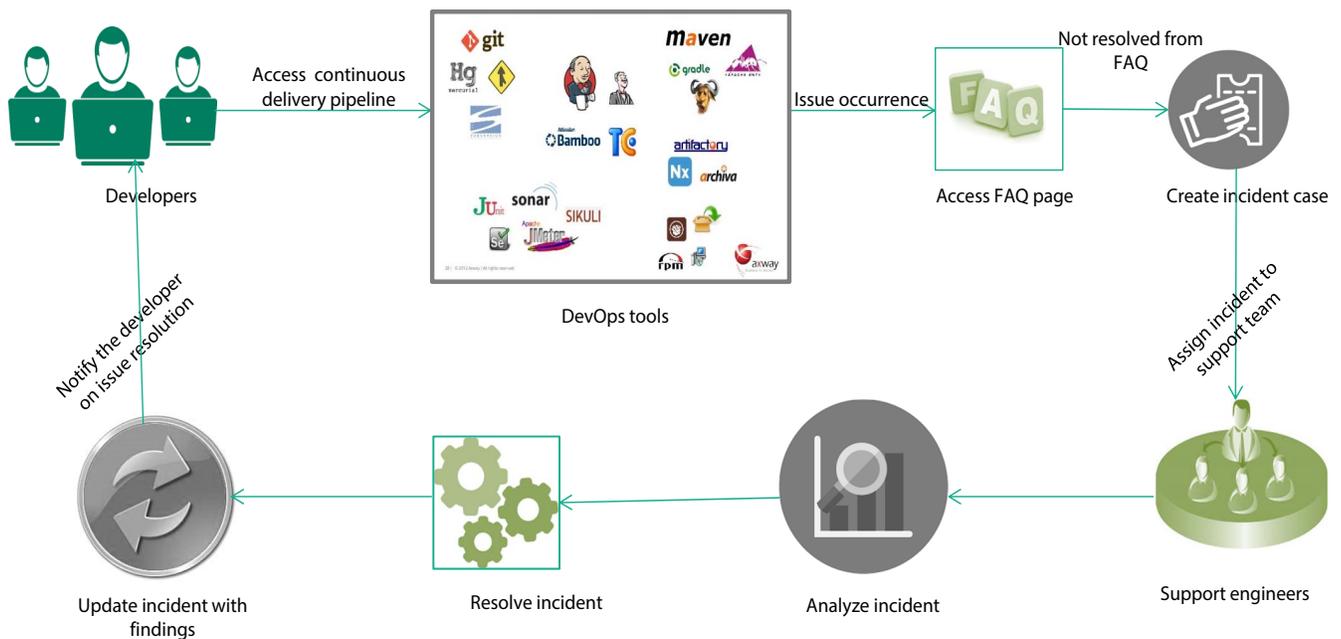
- Gartner

Our experience with chatbot implementation

Let us share our experience with chatbots and how we have implemented a chatbot system using DevOps to reduce the support incident ticket volume, consequently increasing the productivity of support engineers.

DevOps L1 support workflow without chatbots

The diagram illustrates the 'prior to chatbot' implementation L1 support process flow used at a client location as part of DevOps to provide continuous integration tools such as Jenkins, Bitbucket, SonarQube.



The following limitations were found in the above process, which provided scope for automation:

1. Redundant incidents related to access and on-boarding issues were logged by end users.

2. Low priority status was given to monitoring of CI tools and their issue resolution, as the support team used to work on high priority tasks.

3. Availability of subject matter expert (SME) to keep the required people in sync was required sometimes as the status or nature of the issue changed. However, this was not always easy as SMEs were occupied with other priority tasks.

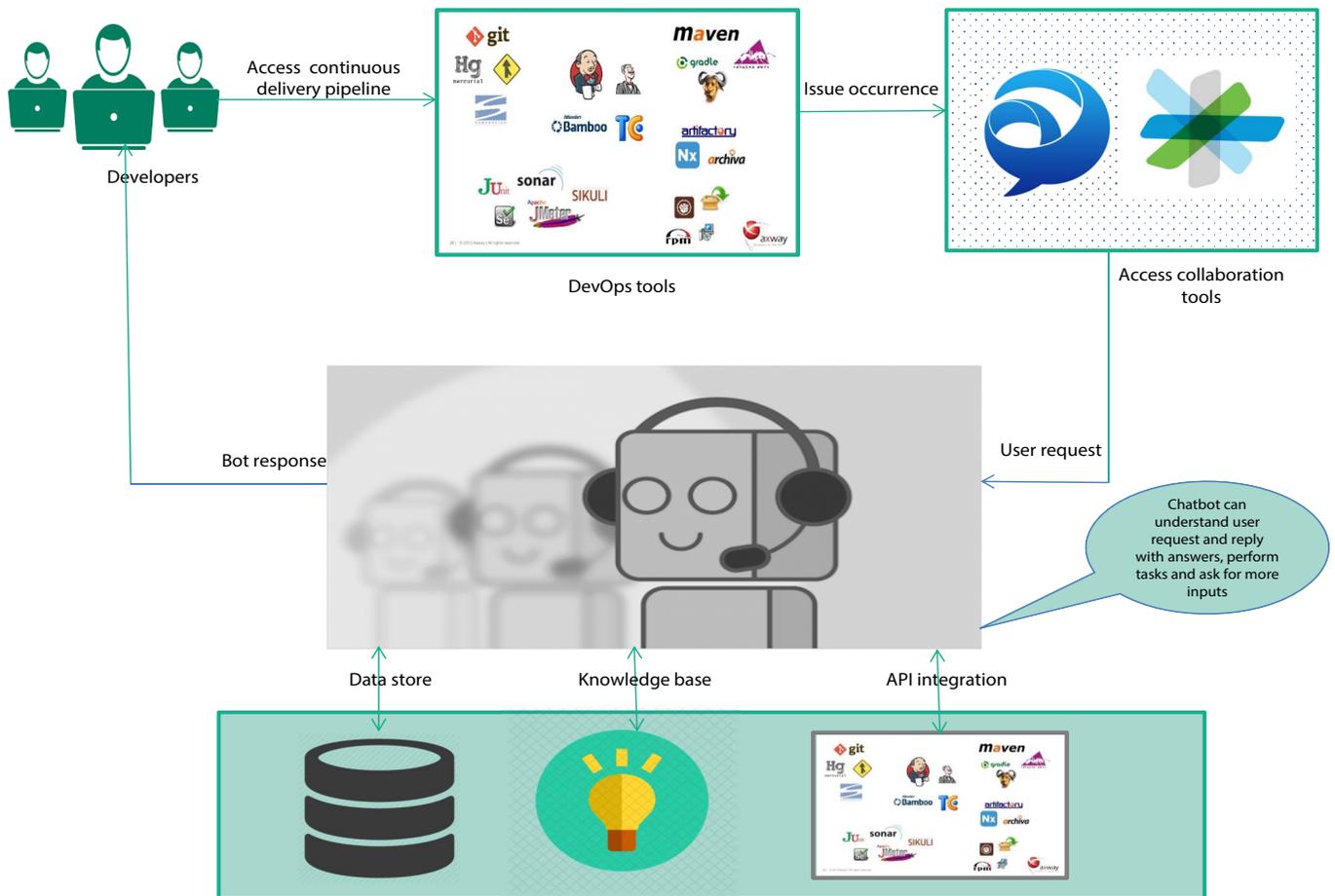
4. Manual support needed to provide 24/7 support for any issue resolution.

5. Service level agreement (SLA) slippages were high in incident resolution as the same support team was occupied with high priority incidents most of the time.

After accounting for these factors, chatbots were proposed as the automation solution.

Simplified DevOps L1 support workflow with chatbots

The diagram illustrates a high level simplified workflow of support use case with chatbots.



Chatbots offered several benefits:

- 1. Increased end user satisfaction:** End user queries were answered promptly, with no slippages in SLA, while providing continuous 24/7 support worldwide.
- 2. Increased productivity:** As chatbots were handling all redundant incidents with

similar responses, the support team could focus on other complex incidents and increase their productivity.

- 3. Reduced capex** on support engineers as chatbots were capable of handling multiple requests simultaneously. We observed that 200 L1 incidents were

resolved by chatbots per quarter without human intervention.

- 4. Fewer incidents of missed SLAs and escalations.**
- 5. Ease of handling 24/7 support operations.**

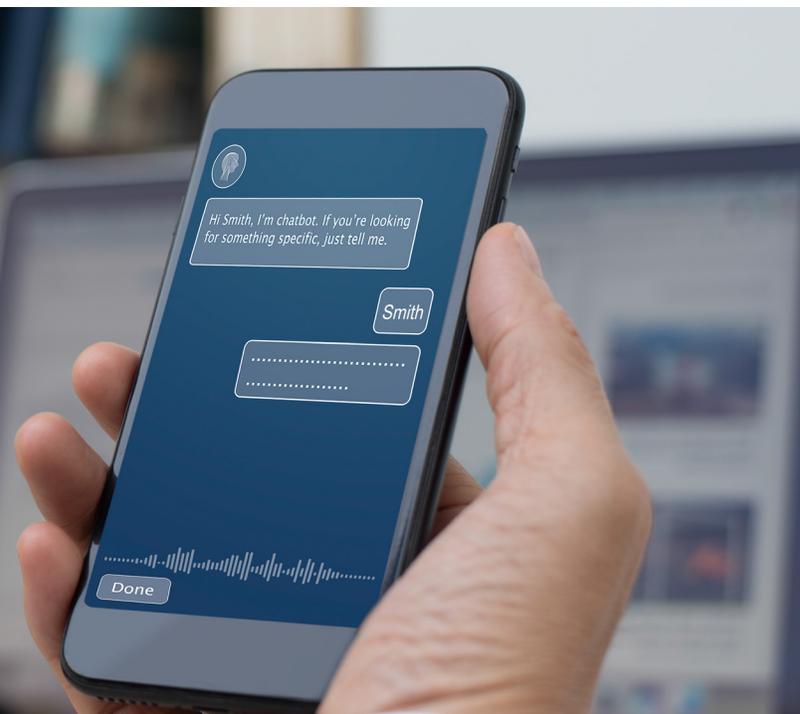


Chatbot frameworks evaluation

One of our major tasks was to evaluate the industry-leading frameworks to suit client requirements and jumpstart the chatbot implementation. This comparison matrix is a reference template to start with and more bot development frameworks and evaluation criteria can be considered based on the requirements.

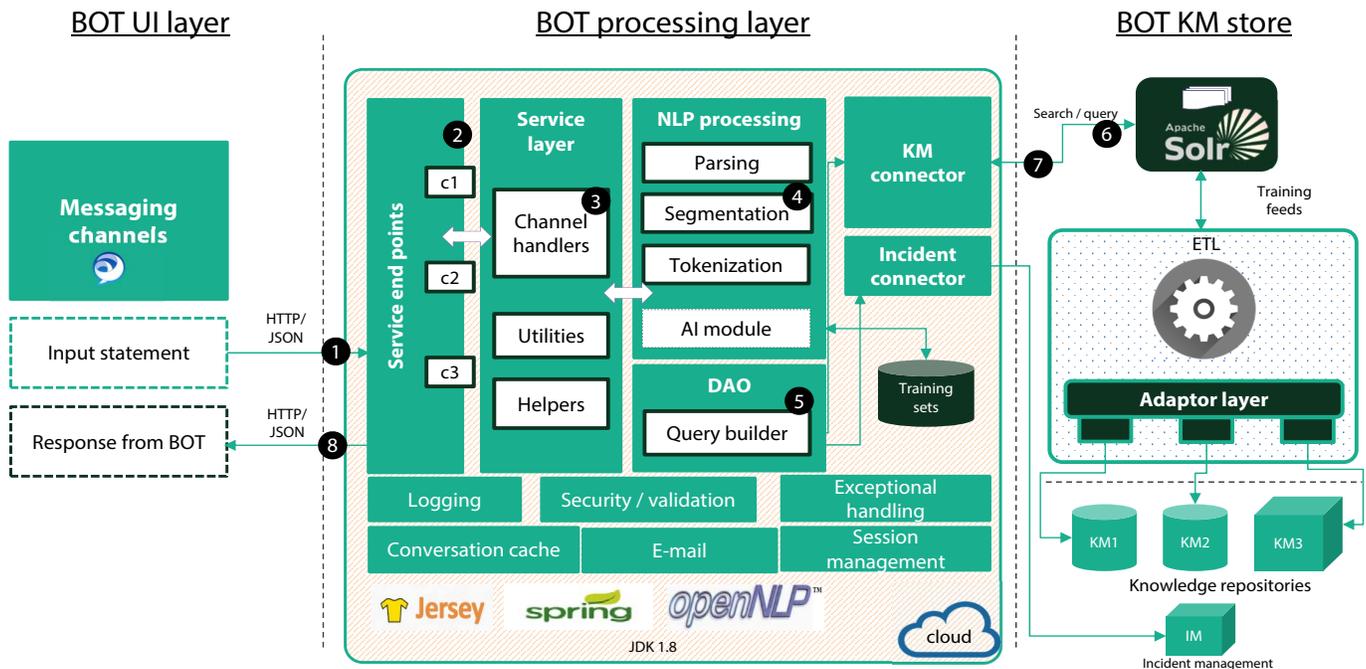
Features	IBM Watson	Dialogflow(API.ai)	Microsoft Bot Framework
Cloud support	Yes	Yes	Yes
Doc & support	Documentation is very organized and GitHub code samples provided. Good support is provided.	API.AI's console seems to work bug-free, community and email support is available for standard edition. Enterprise edition offers paid enterprise support.	Documentation is good and GitHub code samples are provided. Community support is available, Stack Overflow can be used to post the questions using bot framework tag.
Learning	You are teaching the dialog by writing xml tags to add new concepts, questions and answers.	Dialogflow lets you achieve easily a conversational user experience by handling the NLU. It matches the query to the most suitable intents based on the information contained in the intent and agent's machine learning model.	The framework provides Direct Line REST API, Which can be used to host your bot on webpage or in mobile app. To provide more human like senses we can implement Cortana for voice and LUIS for natural language understanding.
License	Free, Standard and Premium.	Free and Enterprise Edition	Open Source.
Integration with other platforms / channels	It can be integrated with Botkit, which can be integrated with Twilio, Slack and Facebook Messenger.	It can be integrated with many popular messengers, IoT, and virtual assistant platforms. Some of them are actions on Slack, Google, Skype, Facebook Messenger, Kik, Line, Telegram, Amazon Alexa, Twilio SMS and Twitter.	It can be integrated with Facebook Messenger, Slack, Webchat, GroupMe, SMS, Telegram, e-mail and Skype.
Available SDK & Libraries	It supports Node SDK, Java SDK, Python SDK, iOS SDK and Unity SDK.	It supports Android, iOS, Cordova, HTML, JavaScript, Node.js, .NET, Unity, Xamarin, C++, Python, Ruby, PHP, Epson Moverio, Botkit and Java SDKs.	It contains Bot builder SDKs for .NET and Node.js, Bot Connector, Portal and Bot Directory.
Ease of use	Complex	Simple	Simple

Source: <https://chatbotsjournal.com/25-chatbot-platforms-a-comparative-table-aeefc932eaff>



Custom bot reference architecture

The cost of customization for these frameworks was high. So we developed a custom chatbot framework to handle requirements and provide ease of extensibility and scalability. This reference architecture can be leveraged to build customized chatbots:



Custom Bot Framework is an artificial intelligence-based framework, developed leveraging cognitive computing technologies to enhance the customer experience and make it more intuitive, natural, and 'fun' to interact with self-service channels such as IVR, phone, wearables, and portals.

The benefits of the custom-built AI bot framework include:

- **Requirements match** – Able to match all requirements and provide ease of extensibility and scalability

- **Enhance customer experience** – This framework resolves customer problems very quickly and allows effective customer care interaction by providing human-like response and interaction with online channels such as Facebook, iWatch
- **Reduce agent cost** – High customer care agent costs can be reduced significantly by AI engine automated responses for repetitive requests
- **Learning** - With AI learning of customer patterns and behavior, the chatbot

improves the customer experience with scaled down costs

- **Natural language** – Free flow natural language can be identified to support complex customer care support workflows
- **Open integration** – Moving away from tightly coupled legacy systems to a more open integration and decoupling of system functions for its internal flow, leading to efficiency in touch points and automation across AI, CRM, and IVR

Lessons learnt from chatbot implementation

- Architecting an application as a single bot with different functionalities is not scalable and maintainable, multiple bot implementations are advisable
- If multiple bots need to be created for different functionalities, the end user has to interact with many bots to fulfil requests. To overcome these problems, we need to create a master bot exposed to the end user that internally interacts with child bots. With this feature, any

bot can be plugged to the master bot without disturbing the end user and can be reused in different bots

- The bot framework uses its internal storage to save bot state, which will not work for enterprise bots and also affect the performance. To increase the performance, use custom bot state implementation to store the bot state in in-memory data store such as Redis
- Hybrid chatbots route customer queries based on the sentiment, context, and request. Text analytics and machine

learning can be used in the bot framework to ensure high accuracy for different languages. Microsoft Cognitive services are used to achieve this functionality

- Even though the bots are smart enough, there are a few scenarios such as escalation, triage, when the bot gets stuck, and needs to hand off conversations to a human being. Bots should recognize this handoff and provide a smooth transition to the user



Conclusion

Chatbots are becoming ubiquitous. One must have the foresight to adopt the right bot framework or choose the most appropriate technology stack to build one custom bot, considering current and future growth. Chatbots provide automation and can enhance end user communication. They are the building blocks of messaging platforms and their usage is increasing. Chatbots can dominate most business areas, but random adoption of any technology without undertaking scientific analysis can lead to failure or even losses. We recommend a holistic evaluation before investing time, effort and money into chatbot adoption.

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