

*Driving Digital Transformation in  
HR Tech with*

**CHATBOT TECHNOLOGY**



## WHY CHATBOT?

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Artificial Intelligence (AI) has become a household name with the emergence of virtual assistants like Alexa, Google Assistant, and Siri. With such deep penetration and innovation in technologies like Artificial Intelligence (AI), Natural Language Processing (NLP), and Machine Language, it is natural for user expectations to change from organizational software as well. Chatbots have never been more relevant.

### Chatbots For Human Resource (HR) Management

As the adoption of AI grows across enterprises, the potential for chatbot solutions grows too. Chatbots and conversational interfaces could be beneficial to several enterprise systems, but HR systems are the ripest area for their adoption. Here are some critical reasons for HR Tech ISVs to consider chatbot development.

- **The growing popularity of messaging platforms:** Messaging platforms like Slack and MS Teams have become the de facto communication and distribution mechanism across most organizations today. Their increasing popularity and usage are due to the inherent advantages they bring along, like an increase in productivity, reduction in emails, and improved transparency. Since these platforms are mainstream in many organizations, it makes very good sense to deploy chatbots on top of these platforms. (Source: [Slack, Customer Reports](#))
- **Going beyond automation:** Organizations are looking for innovation and augmentation beyond the traditional robotic process automation, and that's where AI-based chatbots can play an important role. Solutions that can address business outcomes through predictions, autonomy, self-learning, and decision making, are the need of the hour. (Source: [Capgemini Application Landscape Management](#))
- **App Proliferation:** Application proliferation is a real challenge that organizations are facing today. There are newer risks to be managed, besides the cost associated with under usage of applications. This proliferation, combined with advancements in artificial intelligence, is fueling the need for chatbot development. Organizational users seek bots that can carry out a plethora of tasks through a single conversational interface. They want bots for scheduling a meeting, applying for paid time-offs, educating them on various organization policies, recommending health benefit plans during open enrollments, and many more such tasks. (Source: [Forbes](#))

*Derived from our experience at Harbinger, this whitepaper talks about the most common enterprise use cases for chatbots in HR, technology that encapsulates chatbots, best practices, and development challenges for chatbots.*

## TYPES OF CHATBOTS

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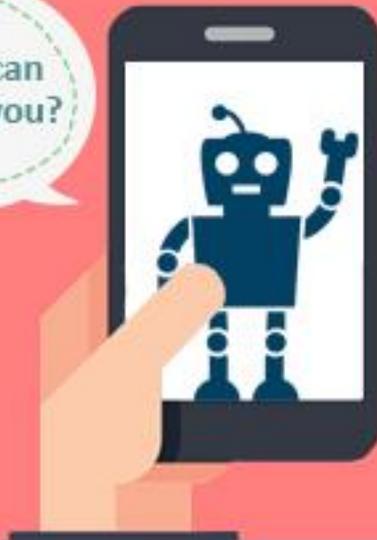
Before we proceed to explore the technical intricacies of chatbots, it would be important to understand about the three main types of chatbots that can be deployed by organizations.

- **Question & Answer (Q&A) bots:** These are the simplest form of chatbots used in organizations. They are an automated version of the Knowledge Base (KB) or Frequently Asked Questions (FAQ) published by HR.
- **Agent Bot:** These bots are more capable than Q&A bots. Besides retrieving static information, they can go a step ahead and complete workflows. For instance, the Agent bot can answer queries related to Leave policies. Additionally, it can go a step further and apply for a leave on the employee's behalf. These are ideally appropriate to entertain support and help desk requests.
- **Intelligent Bot:** These bots are the most advanced of the three. They are context-aware and use Artificial Intelligence (AI) and Machine Learning to answer, recommend, and execute different actions on behalf of the user. Importantly, these bots learn from user inputs and actions, and over time become more self-sufficient and capable of taking decisions. They are tasked with complex use cases in recruitment, learning, performance management, and other HR scenarios.

*Leveraging right type of bots that is most appropriate to your business requirement, is critical to the success of your investment in chatbot technology.*



By 2020, 85% of engagement with the enterprise would be fielded without human intervention. [Source: Gartner Predicts](#)



## Q&A BOTS

- ▶ Product User Guide
- ▶ Policy Management
- ▶ Basic Support

## AGENT BOTS

- ▶ Time-Off / Scheduling
- ▶ Surveys & Polls
- ▶ Concierge



## INTELLIGENT BOTS

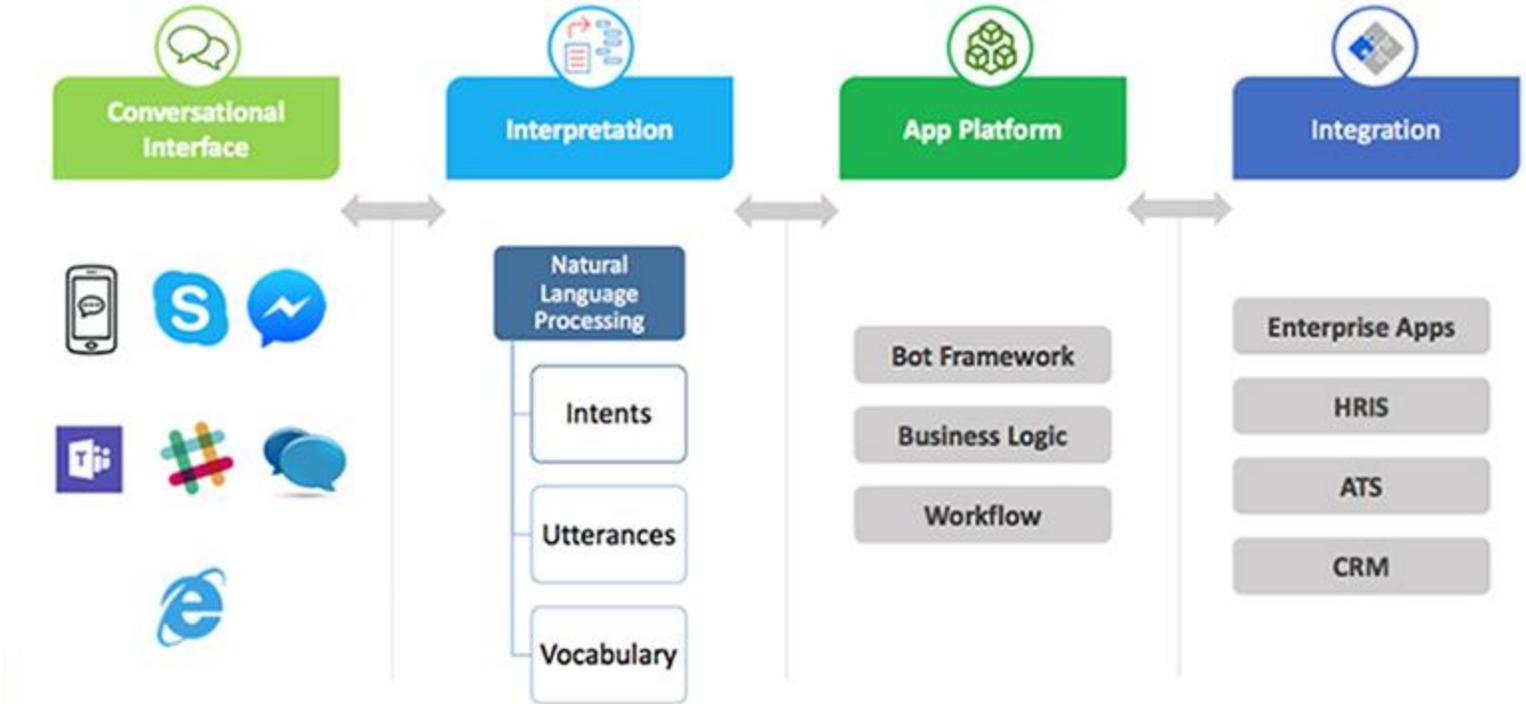
- ▶ Shortlisting Candidates Based ON Profiles
- ▶ Policy Recommendations
- ▶ Personalised Onboarding
- ▶ Assessments / Reviews



Learn more about the benefits of chatbots for various HR use cases

# CHATBOT TECHNOLOGY

## Building blocks of Chatbot



- **Conversational interface:** Most, if not all, chatbots across organizations, work right inside messaging platforms (also known as channels or bot platforms) with standardized conversational interfaces. The most common ones being Skype, Slack, HipChat, Facebook Messenger, and Microsoft Teams.
- **Interpretation:** NLP technology is at the core of any bot. It helps map human inputs to actions within an application. This technology comprises of utterances, intents, entities, responses, and a context. An utterance is a textual input that the chatbot needs to interpret. An intent represents the actions to be performed on entities which are derived from the utterance. Anything that the bot says in response to the utterance is called response. Context helps keep track of the topics in a conversation.
- **App platform:** The app platform comprises of a bot framework, a rule engine, and workflows. Bot framework establishes a common set of processes and guidelines to be followed during chatbot development. Rule engine houses the business logic. Workflows decide what the bot will do as a response. Static workflows are defined for Q&A and agent bots. For intelligent bots, machine learning is incorporated to train the bot with data-sets in real-time to continually improve its domain knowledge and performance.
- **Integration:** Chatbots need to integrate with many third-party systems and applications in an organization, and present a unified interface that is easy to use, secure, and apt for most business use-cases.

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# BOT FRAMEWORK COMPARISON

A bot framework basically comprises a set of development methods and processes to follow for creation of a chatbot.

Parameter	Microsoft Bot Framework	Dialogflow	AWS Lex	IBM Watson Conversation
Prerequisites	<p>Visual Studio 2015/2017, Bot Framework Channel Emulator, NuGet package 'Microsoft.Bot.Builder'</p> <p>A Microsoft Account (Hotmail, Live, Outlook.Com). An Azure subscription. A communication service like Skype, Slack, or the web.</p>	No prerequisites, can be implemented with any language that supports REST such as JavaScript, Node.js and etc	AWS Account, AWS Console or CLI	Blue mix account to get the API credentials for IBM Watson conversation service
Available SDK & Libraries	C# .NET(LUIS), Node.js (SDK) and REST API, Java and Python (Preview mode)	Node.js, Java, Go, Python, Ruby, PHP, C#	SDKs: Java, JavaScript, Python, .NET, Ruby, PHP, Android, iOS, React Native, Mobile Web	Node SDK, Java SDK, Python SDK, Android SDK, Unity SDK, Swift, Salesforce, OpenWhisk, Ruby, .NET
Natural language understanding (NLU)	Language Understanding Intelligent Service (LUIS) is available. This enables developers to build an application which understands natural language and respond accordingly to user messages.	Dialogflow is itself a NLU service. It relies on entities, utterances and intents to for natural language processing.	Powered by the same technology as Alexa, Amazon Lex provides ASR(Automatic Speech Recognition) and NLU(Natural Language Understanding) technologies to create a Speech Language Understanding (SLU) system. Through SLU, Amazon Lex takes natural language speech and text input, understands the intent behind the input, and fulfils the user intent by invoking the appropriate business function.	IBM Watson conversation service has built in natural language processing with the help of intents entities and dialog flow defined while designing the bot
Integration Channels	Cortana, Skype, Web Chat, GroupMe, Facebook Messenger, Kik, Slack, Telegram, Direct Line, Twilio, Email, Line and Microsoft Teams	Google Assistant, Facebook Messenger, Skype, Slack, Telegram, Viber, Twitter, Kik, Line, Cisco Spark, Cisco Tropo, Twilio, Twilio Programmable Chat, Dialogflow Phone Gateway (Beta)	Facebook, Twilio, Slack, and Kik,	Slack, Facebook, Twilio
Deployment Process	One can host the bot on any available service, such as Azure. If the bot is created using Bot Builder SDK for .NET, it can be directly deployed from Visual Studio.	For the purpose of a basic bot one can use the Dialogflow UI and basic messages configured in the service for deployment. The other method is hosting the UI and the webhook on a server.	With Amazon Lex, you can build, test, and deploy your chatbots directly from the Amazon Lex console.	API credentials are given once we create the conversation service which are used to consume the Watson conversation APIs
Language Support	English, French(France and Canada), Italian, German, Spanish(Spain and Mexico), Korean, Portuguese(Brazil), Japanese, Chinese, Dutch, Turkish	English(US, Australian, Canadian, UK, Indian), Chinese(Cantonese, Simplified, Traditional), French(Canadian, France), German, Hindi, Indonesian, Italian, Japanese, Korean, Norwegian, Polish, Brazilian Portuguese, Russian, Spanish(Spain, Latin America), Swedish, Thai, Turkish, Ukrainian	Presently, Amazon Lex is limited to support of US English.	English, French, German, Italian, Japanese, Korean, Brazilian Portuguese, Spanish, Chinese(Simplified, Traditional)



## CHATBOT SOLUTIONS FOR HR

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There are several use-cases that chatbots can address within the HR function. We, at Harbinger, have seen a surge of chatbot requirements for recruitment, benefits & payroll, employee self-service, and corporate learning needs in organizations.

- **Recruitment:** Recruitment brings in scale issues for HR and that's where chatbots can help. Different types of bots can address multiple use-cases throughout the recruitment cycle – right from screening to background checks. For instance, when staffing platforms sends out the job alerts via SMS, candidates have to engage over phone to ask their queries. Here text based Q&A bots can be used to share job-openings or deliver frequently sought information about the company or interview processes as required by candidates. These bots essentially help save time which the recruiter would have otherwise spend in answering the same questions repeatedly. Agent bots can be deployed for quick resume submissions, pre-screening of candidates, and scheduling interviews. Intelligent bots can come in handy for activities like automated matching of candidates to job posting and send the same to them as soon as job is posted in VMS platforms.
- **Benefits & Payroll:** Benefits enrollment and payroll are amongst the most confusing yet critical modules of HR information systems. Employees generally have many queries around both, and HR have to spend a lot of hours responding. Ensuring instant answers to these queries is important since these are considered hygiene factors for employees. And chatbots can help do this quickly and more importantly, in a flawless manner. Benefits & payroll solutions mostly deploy Q&A bots, but there are possibilities to implement intelligent advisory bots that helps employees to choose appropriate benefit plans with AI-based recommendations.
- **Employee Self-Service:** Employees now prefer taking actions themselves through mobile or messenger platforms used across their organizations. Recognizing peers, meeting scheduling, conference room booking, are now primarily self-service tasks. Agent bots can be used to implement such workflows in HR systems.
- **Corporate Learning:** Learning was revolutionized by the use of mobile in the past decade and is now progressing to chat and messengers platforms. Be it onboarding or on-the-job training, employees prefer to ask questions or take a course right within the messenger platform. This ensures that learning is continuous and in granular form and doesn't stretch their attention span and time-availability.

## CHALLENGES WITH CHATBOT

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- **Training a chatbot:** User experience and satisfaction with chatbots is predominantly dependent on how well has the bot been trained and deployed. Bots that have been built using NLP and pattern/speech recognition, have to be repeatedly trained with new and updated data-sets to ensure higher accuracy and better user experience. This calls for significant investment both in terms of time and money.
- **Integrating with other systems:** Chatbot frameworks generally propose integration with messaging platforms or conversation interfaces. However, to provide a holistic experience for end-users, the integration needs to be much deeper - with organization-wide HR information systems. This adds to the complexity and cost of implementation, besides increased stakeholder buy-in.
- **Maintaining privacy and security:** No data should leave the company firewall through a chatbot. All data needs to be on a secure platform and encrypted. The stakeholders additionally need to ensure that no critical or sensitive data about the organization or its employees can be put together through any question combinations. Chatbots also need to operate within legal boundaries, specifically in regulated areas like healthcare planning or financial services, where various legal and ethical consequences can arise from specific recommendations.
- **Balancing functionality and accuracy:** There is a fine balance between functionality and accuracy of the machine learning that needs to be targeted. Machine learning models will not be 100% perfect at the early stages and require a good amount of training with quality data. While trying to achieve accuracy, chatbot conversations should not get so long that the employee gets frustrated and loses interest.
- **Humanizing the conversation:** Humanizing is a key requirement and a key challenge as well when it comes to chatbots. While it may not be possible to humanize chatbots completely, but they could still be made human-like to a large extent by taking care of soft characteristics like its character, persona, or tone. Also pay attention to things like typo correction, context understanding, personalization, etc. And, if possible, have an option for your user to switch to a human operator whenever needed.

*Based on our extensive experience of developing chatbots, we have noticed that there are some significant challenges with chatbots. But the good news is that most of these challenges could be kept at bay when you can plan the right precautionary measures beforehand.*

## EXPEDITING CHATBOT DEVELOPMENT

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Since last couple of years, Harbinger has helped several HR tech products build conversational chatbot and successfully deploy it to production. Below are few accelerators developed at Harbinger that has helped them achieve early time to market thereby giving the competitive edge in the market.

- **Domain Knowledge:** Domain knowledge plays an important role when it comes to developing chatbots. It helps with knowing which workflows can be replaced or implemented with a bot and how. And also, the right knowledge coupled with ready-to-incorporate HR Corpus, rule-based engine, and machine learning models, makes things easier to implement.
- **AI Capability:** Creating a knowledge-base from existing data and repurposing training content in a form that is suitable for bot training is a time-consuming task which can significantly hinder chatbot deployment. An ideal workaround is to use AI-based solutions. An interesting example here would be that of an AI-assisted framework for chatbot training that helps automatically generate questions from unstructured training content. Because of its AI capabilities, it can reduce the time required to create training data by up to 70%.
- **Proven Framework :** Proven frameworks and well-tested solutions are a boon to chatbot development. There are quite some frameworks available in the market to help develop conversational bots rapidly. An important consideration while choosing any framework should be the user experience that it would enable the bot to deliver. Modern UX processes to develop conversational interfaces are important to help you design and develop best-in-class chatbot solutions.

*Domain knowledge, AI expertise and ready-to-use frameworks assure cost-effective development of chatbots with a faster time-to-market.*

## SUMMARY

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Due to advances in AI technology, increased usage of messengers, and maturing frameworks and platforms, the need to automate and serve via a bot is growing for most organizations. These bots entail rule-based pattern matching, NLP, speech recognition, and AI-assisted conversational models to automate business processes that include both simple and complex workflows.

At the core, chatbots can fulfill business needs in three distinct forms – As Q&A bots, agent bots, or intelligent bots. However, there is no one-size-that-fits-all kind of a solution that can be implemented considering the varied requirements, frameworks and challenges involved. You need to work in tandem with a reliable and experienced partner to develop custom chatbot solutions that fit-in well with your clients' needs.

Harbinger has been leveraging proven frameworks and methodology to develop several chatbots for the HR domain. This puts us in a position to understand your requirements better and recommend the most optimum approach to follow for chatbot development. Learn more about our chatbot services here. If you have any specific questions, ideas, or requirements about chatbot technology and its applications, reach out to us at [hsinfo@harbingergroup.com](mailto:hsinfo@harbingergroup.com).

## ADDITIONAL READING

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### ► Case Studies:

- [Modern UX processes to develop conversational interfaces](#)
- [Chatbot for Leave Management](#)
- [Chatbot for User Onboarding](#)
- [AI based recommendation chatbot for a learning platform](#)

### ► Blogs:

- [How can chatbots help in benefits administration?](#)
- [How automation with bots will change recruiting forever](#)
- [Build a better onboarding process using AI](#)
- [Chatbot Training on Steroids with AI Assisted Framework](#)