



# Business Assurance for Voice-Enabled Digital Assistants

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Training and testing emerging digital assistants isn't easy given the complexities of language and multiplicity of vocal inflections, as well as the intricacies of business processes and underlying artificial intelligence technology. Automating the quality assurance process can ensure greater accuracy and end-to-end coverage.

## Executive Summary

Leading the next digital wave, artificial intelligence (AI) opens up uncharted avenues for businesses to connect with end users. One such advancement is conversational AI, which is featured in voice-enabled digital assistants such as Amazon's Alexa, Apple's Siri, Microsoft's Cortana and Google's Google Assistant. If humans are on one end of the spectrum, and machines on the other, digital assistants are midway to machines impersonating humans by providing lifelike assistance.

Today's conversational bots are a league ahead of the interactive voice response (IVR) systems used in many call centers. For starters, they are imbued with human voices and sensibilities for smooth interactions with customers.

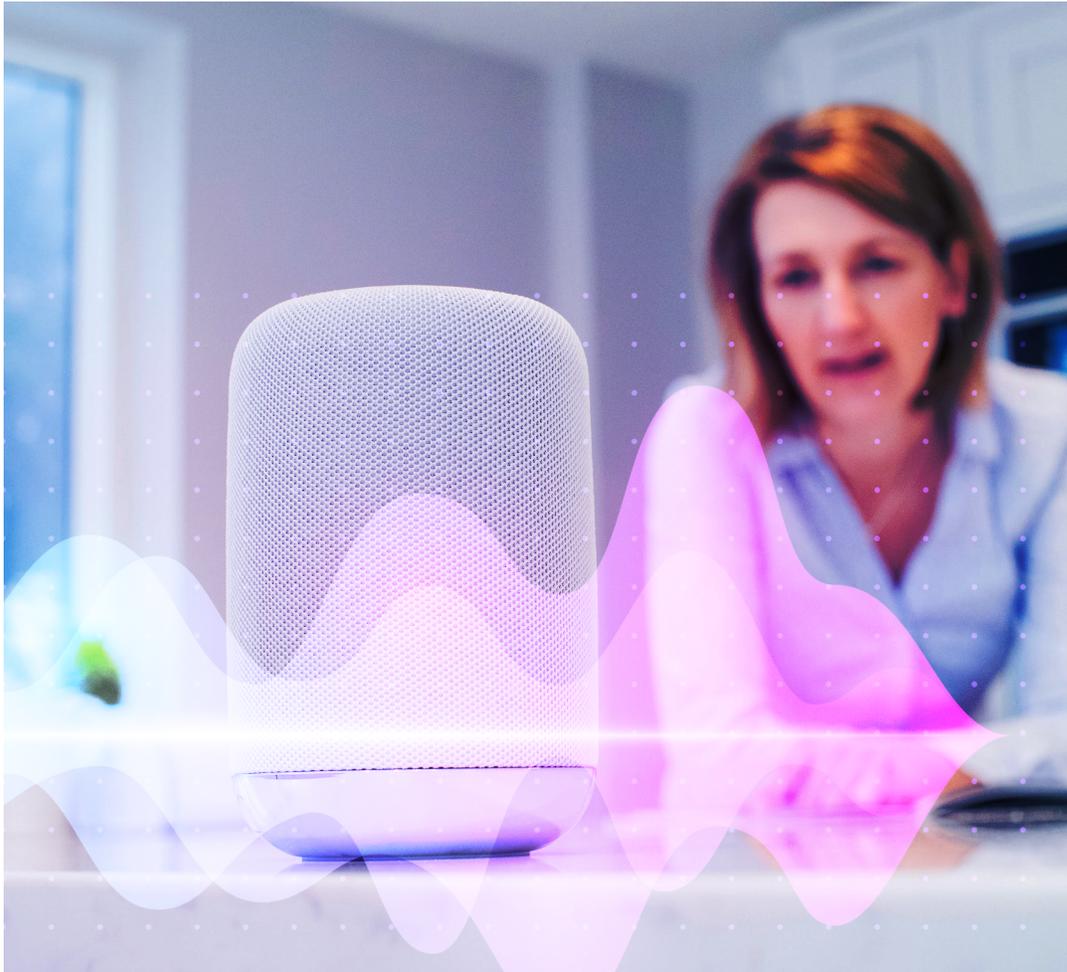
In principle, digital assistants leverage technologies such as the Internet of Things (IoT) for data collection, and cloud computing for processing. They continually "listen" in to conversations and "learn" from data stored in the cloud to devise customized responses. For businesses across various industries – be it financial, insurance or e-commerce – digital assistants enable a more

personalized customer experience, promoting self-help, cross-selling products and reducing resolution time for queries or complaints.

However, there are some caveats. Incidents such as unprompted eerie laughter from Alexa, reported by several users in the UK,<sup>1</sup> underscore the need to assure the quality of the AI before it touches end users. AI systems should be trained

to adhere to digital ethics – such as steering clear of biases and restricting the unsolicited use of confidential data. Moreover, businesses deploying digital assistants need to safeguard user data in the cloud.

This white paper outlines a business assurance strategy for organizations seeking to leverage the extraordinary potential of digital assistants.



## Alexa, Help Me ...?

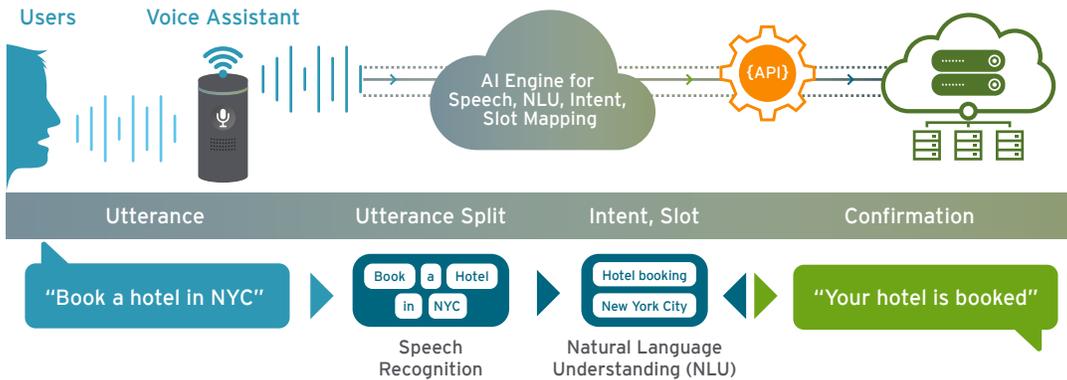


Figure 1

### UNDERSTANDING DIGITAL ASSISTANTS

Much like the structured language used by humans, where a word signifies an object, digital assistants rely on a combination of utterances and intents to respond to voice commands. Figure 1 highlights how conversational AI works in the context of Amazon’s Alexa.

**Utterances:** An utterance is the input from the end user. It may be a sentence, such as “book a hotel in NYC,” or a fragment of a sentence, such as “book” or “hotel NYC.” Utterances are not always well formed and are impacted by variations in user accent.

**Intent:** The intent is a purpose or goal expressed in a user’s input (utterance), such as booking a hotel, paying a bill or finding a news article. An intent represents what the user wants the digital assistant to do; the action to be taken is coded in the business process/technology that the AI is trained in.

**Entity:** An entity represents detailed information that is relevant in the utterance. For example, in the utterance “book a hotel in NYC,” NYC is an entity. A corresponding reference for an “entity” in traditional coding is a variable.

### Deconstructing Conversational AI

Sample User Utterance	Intent	Entities
“Book a hotel at NYC?”	BookHotel	NYC
“Help me book a hotel at London”	BookHotel	London
“When does your store open?”	StoreHoursAndLocation	open

Figure 2

# Since human QA professionals train digital assistants, care must be taken to avoid encoding biases that may prove detrimental to business prospects.

To comprehend messages, digital assistants use machine-learning techniques – such as natural language processing (NLP), natural language understanding (NLU) and deep neural networks – that map human speech patterns to algorithms and codes. Once the user utterance is decoded, digital assistants map the intent to the underlying business processes to accomplish the task.

## GETTING THE AI RIGHT

Given accelerating technology advances – from cloud computing to machine learning – business assurance for conversational AI necessitates going beyond traditional quality assurance (QA) practices. To effectively cover all elements, an assurance strategy for digital assistants should consider the following:

- **Business context:** When deploying digital assistants to handle queries and related information, it is important to adequately equip the AI with the knowledge of business processes and context. This not only accelerates query resolution, but will ensure that the right product reaches the target audience. For instance, if a bank deploys a digital assistant to address customer inquiries regarding loans, the AI system needs to be trained in business processes to furnish relevant answers.
- **Technology ecosystem:** Since digital assistants operate in conjunction with various smart devices, it is imperative to ensure interoperability (i.e., the software should mutually communicate). This will help businesses

ensure a seamless customer experience across digital interfaces. For instance, when an end user asks Alexa to order groceries, it should be able to do so from Amazon's Pantry app on the user's smartphone.

- **Data security:** Digital assistants gather reams of customer data, personal and otherwise, while they carry out tasks and commands. Businesses are obligated to ensure this data is safe and is not used in an inappropriate way to sell products and services – or worse. Moreover, as this data is stored in a cloud environment, additional security against pilferage and cyberattacks needs to be maintained.
- **Digital ethics:** Digital ethics relates to socially-responsible behaviors that digital technologies should follow. Since human QA professionals train digital assistants, care must be taken to avoid encoding biases that may prove detrimental to business prospects. For instance, if a female user asks Google Assistant about the best car to buy, the AI system should not suggest cars commonly deemed “girlie”; rather, it should generate gender-neutral results.
- **Nondeterminism:** As human utterances vary from person to person – due to varying dialects and accents – they cannot be codified into a deterministic set. When testing conversational AI systems, businesses must ensure these systems remain responsive to nondeterministic utterances – be they well-framed or open-ended statements.

To ensure end-to-end coverage, the process of testing and training the AI should be automated to trigger continuous feedback loops that feed into the machine-learning mechanism for greater accuracy.

### 'TWO THE T': AUTOMATING TRAINING & TESTING OF DIGITAL ASSISTANTS

As noted, human speech does not comprise perfectly uniform utterances. There can be hundreds of thousands of variations in how a particular intent can be phrased. Manually training the conversational AI system to interpret all such possible combinations of speech and accents is not feasible. To ensure end-to-end coverage, the process of testing and training the AI should be automated to trigger continuous feedback loops that feed into the machine-learning mechanism for greater accuracy (see Figure 3).

In light of the above, businesses deploying conversational AI should therefore:

- **Train:** For the AI system to understand business processes and end users, it must be trained to understand all possible utterances and dialects. Better comprehension of voice commands can be achieved by using a detailed round of voice training. Since a single commercial off-the-shelf tool would not be able to fully automate the training, QA teams can instead deploy a suite of automated language grammar tools, along with a repository of business keywords and speech libraries.

This helps in auto-generating the training set (utterances) via a speech bot that automatically feeds in all permutations of a specific query and elicits responses from the AI system, until it responds correctly for each permutation. This training improves AI

## End-to-End Automated Training & Testing of Digital Assistants

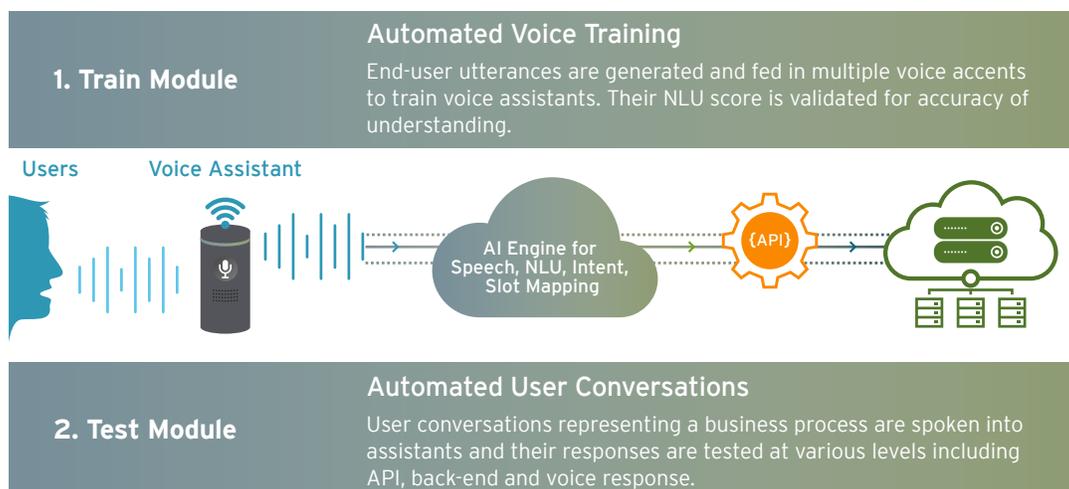


Figure 3

# When the functional accuracy of the AI system is tested through automation, customer experience can be validated by using real-world crowd testers to further hone the AI for the user experience.

speech recognition in the context of business processes. It must be performed for all voices and accents prevalent in the target market. With repeated monitoring of the natural language understanding (NLU) score and mismatches between human utterances and intents detected by the AI system, greater AI voice recognition accuracy is achieved.

- **Test:** To test the AI system for business processes, businesses should automate conversations with multiple user profiles, which will save laborious manual effort. These user profiles can be tested with automation scripts to validate the API responses and the enterprise's back-end system. A combination of speech libraries, along with standard API and back-end automation tools, are deployed to ensure end-to-end automation. When the functional accuracy of the AI system is tested through automation, customer experience can be validated by using real-world crowd testers to further hone the AI for the user experience.

The key to success lies in an automation-first approach that ensures end-to-end coverage and high accuracy (see the Quick Take on the next page).

## A WAY FORWARD

Conversational AI, like any other machine-learning algorithm, needs to continuously learn in order to stay relevant. Hence, digital assistants should be exposed to a variety of instances, each evoking a unique response. The higher the exposure to unfamiliar user phrases, the more the AI systems can learn and the better they will perform.

There are three key aspects for an end-to-end assurance strategy:

- Train the AI system in the context of the business process(es) to be delivered.
- Test the AI in the context of user profiles and enterprise IT architecture.
- Leverage real-world crowd testers to validate the AI for a better customer experience.

As digital assistants weave a wider ecosystem around them, the approach to QA must also encompass experts in domain knowledge, technicalities and user experience. This will help IT teams achieve a well-rounded AI validation strategy that covers aspects of business, technology and customer experience assurance.

## QUICK TAKE

# Amazon's Alexa Ensures Superior Customer Experience for a U.S.-Based Insurer

To operate in the customer-centric digital era, our client, a U.S. insurance company, needed to overhaul its self-service applications to reduce the wait time for resolving queries and improve customer experience. To enable this, our client sought to leverage the potential of conversational AI.

After assessing the client's call center data, we found that Amazon's Alexa was the best choice to promote self-help and cross-sell products based on customer preferences. Alexa was tested and trained with 10,000 automated utterances for correct responses, based on customer utterances in various accents using an automation tool. This reduced the training effort by 30%. A generic reusable framework was also created, with which the client can deploy its Alexa implementation on other internal projects.

## BENEFITS

Alexa now presents customers with key account information in a simple and conversational way. Some sample utterances: *"Alexa, what is the status of my claim?"*; *"Alexa, how to file a claim?"*; and *"Alexa, how do I pay my bill?"*

It improved the end-user experience by delivering faster responses to customer queries. The results:

- Tripled the net promotion score (NPS).
- Delivered 45% improvement in the time taken to settle claims.

## FOOTNOTE

<sup>1</sup> [www.bbc.com/news/technology-43325230](http://www.bbc.com/news/technology-43325230).

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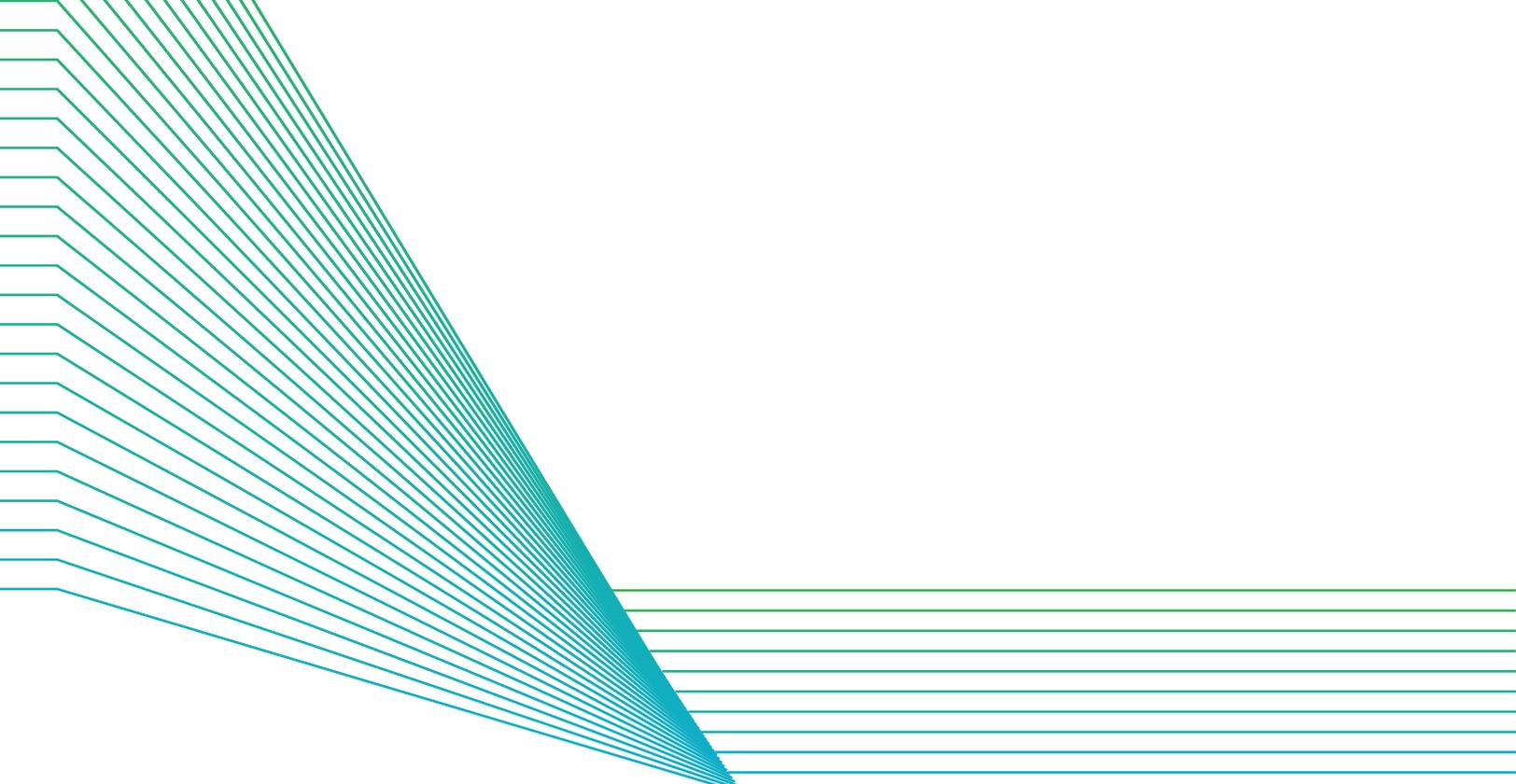
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## ABOUT COGNIZANT QE&A

Cognizant Quality Engineering & Assurance (QE&A) helps businesses succeed by delivering digital with quality at speed. With 650-plus clients across industry verticals and a global footprint, Cognizant QE&A is a recognized thought leader in the quality assurance space. We start by putting quality in the fast lane with relentless automation and intelligent QA. Cognizant QE&A is reimagining quality with Cognizant QA Hub, an ecosystem that brings together deep industry expertise, QA intellectual property and innovation supported by compelling partnerships and vibrant communities. Cognizant QE&A enables clients to experience the opportunities when the quality is right. To learn more, visit us at [Cognizant QE&A](#).

## ABOUT COGNIZANT CONVERSATIONAL AI

Cognizant's Conversational AI Practice helps clients evaluate, design, deploy and support cognitive solutions built on the most advanced technologies available. As a vendor-agnostic group, we offer the choice and flexibility of solutions tailored to each customer's requirements. Through our numerous projects and engagements, we have acquired technology depth and integration experience that inform the development of our customer journey process and other accelerators. Combined with Cognizant's leadership in digital solutions, deep industry knowledge and global scale, our capabilities in the conversational AI space can help enterprise clients develop a unique competitive edge. Visit us at the [Conversational AI](#) section of our website.

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## ABOUT COGNIZANT

Cognizant (Nasdaq-100: CTSB) is one of the world's leading professional services companies, transforming clients' business, operating and technology models for the digital era. Our unique industry-based, consultative approach helps clients envision, build and run more innovative and efficient businesses. Headquartered in the U.S., Cognizant is ranked 195 on the Fortune 500 and is consistently listed among the most admired companies in the world. Learn how Cognizant helps clients lead with digital at [www.cognizant.com](http://www.cognizant.com) or follow us [@Cognizant](#).



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