

IDC TECHNOLOGY SPOTLIGHT

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Artificial intelligence (AI) is at the heart of digital disruption. While the power and promise of AI are varied and exciting, organizations are challenged to successfully transition past proof of concepts to production and scale.

Accelerate and Operationalize Chatbot Deployments Using Conversational AI Platforms

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Introduction

Digital transformation (DX) is reaching a macroeconomic scale. Intelligent applications based on artificial intelligence (AI), machine learning (ML), and continual deep learning (DL) are the next wave of technology transforming how consumers and enterprises work, learn, and play. What differentiates winning organizations is how they leverage AI/ML to deliver meaningful, value-added predictions and actions for improving industrial processes, healthcare, experiential engagement, or any other kind of enterprise decision making.

AT A GLANCE

KEY STATS

» IDC predicts that 40% of DX initiatives will use AI services by 2019 and that AI-enabled human-computer interfaces and business process automation will replace a third of today's screen-based B2B and B2C applications by 2024.

IDC predicts that by 2019, 40% of DX initiatives will use AI services; by 2021, 75% of commercial enterprise applications will use AI; and by 2024, AI-enabled human-computer interfaces and business process automation will replace a third of today's screen-based business-to-business (B2B) and business-to-consumer (B2C) applications. In the digital era of hyper-personalization and digital assistants, chatbots have emerged as one of the few channels that can offer a genuine one-to-one experience between brands and users. Chatbots are automated programs that can simulate conversations with people to answer queries and to execute specific task requests. They allow for highly engaging, conversational experiences, through voice and text, that can be customized and used on devices and platforms. Chatbots can be used across industries to improve customer experience, drive targeted marketing, accelerate sales, increase employee productivity, automate facilities and support services, or support industry-specific use cases in finance, travel, and ecommerce.

To make a chatbot, you need to create a complicated back end that uses concepts such as data mining, machine learning, and natural language processing (NLP). Typical chatbot architecture consists of bot engine, back-end applications, and chatbot platforms. The platform allows developers and businesses to create bots effortlessly, even if their coding basics are minimal. The main core of a chatbot platform is artificial intelligence, but it also offers a user-friendly interface with all the necessary settings for customization and personalization. The platform simplifies working with chatbots because it already includes the complete infrastructure and standard communication features, which are packaged in a very simple programming library. Chatbots are easier to deploy, enabling teams to focus on solving important business problems rather than researching communication protocols and addressing infrastructure issues.

Definitions

Conversational AI tools and platforms are used to build conversational applications that answer questions and provide advice and/or recommendations using NLP and other dialogue-related technologies. These platforms facilitate the development of intelligent, advisory, and conversational applications, including intelligent assistants. The technology components of these platforms include text analytics, tagging, searching, machine learning, categorization, clustering, hypothesis generation, and question answering.

For those new to AI, the terminology used can be the first challenge to overcome. What is the difference between AI, conversational AI, and machine learning, or are they interchangeable? In fact, they are related in a nuanced manner and support one another when used in concert. The following list of terms is useful in the discussion of AI technologies:

- » Al is the study and development of software and hardware that attempts to emulate a human being.
- » Machine learning is the process of creating a statistical model from various types of data that performs various functions without having to be programmed by a human. Machine learning models are "trained" by various types of data (often lots of data).
- » General-purpose AI software platforms are used to build intelligent applications that provide predictions, answers, or recommendations and to develop cognitive applications. These applications automatically learn, adapt, and improve over time using information access processes combined with deep/machine learning.
- » Conversational AI software platforms are a subset of AI platforms that are specialized for the development of intelligent digital assistants and conversational chatbots. Conversational AI platforms use content analytics, information discovery, and other technologies (see the following bullet list for more details) to communicate with human beings.

Further, AI-related environments move along a continuum of capabilities from basic functionality to more sophisticated tasks, especially with regard to conversational AI technologies. Some of the technologies that may be present in various conversational AI platforms are as follows:

- » Keyword and phrase recognition enables the system to recognize specific words. It is often an organization's initial foray into AI.
- » Rules and scripting are highly orchestrated process flows based on behavior; for example, "If they say x, do y." Most often, these rules and scripts are created and modified by humans, not machine learning models.



- » Voice and speech recognition involves the translation of spoken or typed phrases into text to prepare the text for analysis. In the past, voice and speech recognition systems were created by human programmers, but today, most of these systems are machine learning based.
- » Natural language processing provides the ability to extract people, places, and things (also known as entities) as well as actions and relationships (also known as intents) from sentences and passages of unstructured text.
- » Natural language generation is the ability to construct textual/conversational narratives from structured or semistructured data.
- » Knowledge bases are needed for conversational AI applications to "understand" context. Knowledge bases need to have repositories of information about one or more subjects organized as entities/intents (see previous bullet point on natural language processing) linked together so that the application can find answers to questions or ambiguous references. Building these knowledge bases can require an organization to invest a lot of effort and time but may be crucial to building a sophisticated conversational AI application depending on the domain.

Benefits

For the past several years, organizations have been looking for new ways to increase sales, reduce costs, or understand their customers better by using various types of automation coupled with big data. To that end, some of these organizations have begun to evaluate a range of cognitive/artificial intelligence system technologies, including artificial intelligence or machine learning tools and "prepackaged" digital assistants. IDC is seeing a trend where enterprise software companies are adding cognitive/artificial intelligence capabilities to their current suite of products or adding new products with cognitive/artificial intelligence capabilities.

In the world of ecommerce, IDC has also predicted that by 2020, 40% of commerce transactions will be enabled by cognitive/artificial intelligence personal shoppers and conversational commerce solutions. Given all of this, conversational interfaces based on conversational AI platforms, if implemented correctly, can offer great potential for improved productivity, increased customer satisfaction, and more revenue driven by these types of applications.

It should also be noted that the use of conversational interfaces driven by conversational AI platforms can provide better customer outcomes and less customer churn, improving a business' bottom line. From a revenue standpoint, this can mean quicker time to market, increased sales, and faster customer decision making fueled by the contextual cognitive services supplied by the conversational AI interface. These systems also can reduce customer interaction time as well as research time, thereby improving overall user satisfaction.

Conversational AI platforms can help customers improve productivity, automation, and consistency in building chatbots. Businesses can standardize on a platform or two, one for all interfaces focused on employee experiences and one for all interfaces related to customer and partner interactions. If used appropriately, these platforms can help customers improve consistency in how decisions are made, improve consistency in interactions with the stakeholders, uncover new insights, increase employee productivity, and increase process automation.



Trends

The demographics of today's consumers and knowledge workers are changing as millennials and Generation Zers become a larger part of the adult population. The clear majority of these two generations participate in one or more social media platforms, and a significant number communicate solely through their smartphones. For many of these consumers, voice-enabled usage has increased significantly over the past three years, and several end-user organizations are considering how to add voice activated functionality to their existing mobile applications. Pervasive digital transformation is occurring within end-user organizations. This transformation is precipitated by the requirements to replace aged legacy systems such as traditional interactive voice response and contact center. The lure of new methodologies to reach customers is leading organizations to consider replacing these legacy systems with the next generation of voice-enabled tools. The growth in messaging (e.g., text messages, Messenger, Slack, Skype) adoption has also happened because many of the messaging platforms have opened their APIs to third parties; in turn, some of these messaging platforms are being leveraged by virtual assistant platforms.

The market for intelligent conversational assistance is growing rapidly, fueled by the use and acceptance of consumer tools such as Google Assistant, Apple Siri, Microsoft Cortana, and Amazon Alexa as well as new products from other IT vendors. Dozens of supplier companies are seeking to address these interface opportunities, and new companies are emerging in the marketplace every day. These suppliers offer a very broad range of capabilities and functionality in developing conversational AI applications.

IT will be expected to become familiar with and begin to use conversational AI platforms in developing next-generation enterprise applications. Many customer service and marketing departments already are looking at or are involved with these technologies, and IT needs to be able to provide advice and resources to support security, interoperability with other enterprise applications, and access to corporate IT resources.

Considering Tech Mahindra

Tech Mahindra launched Makers Lab, its Thin-q-bator/research and development (R&D) division, at the end of 2014 with the goal of changing the fabric of how the company solves customers' problems. In mid-2018, the company set up its R&D arm in the United States and Germany to co-innovate with customers and partner with academia by leveraging next-generation technologies. The new Makers Lab in Plano, Texas, has been established in collaboration with the University of Texas and will sponsor research projects and encourage students to leverage cutting-edge technology solutions in their projects. Tech Mahindra will also offer internship opportunities to around 20 students at Makers Lab. The Makers Lab R&D center in Munich will provide 100% onsite support to customers in their digital transformation journey. With the launch of Makers Lab in both the United States and Germany, Tech Mahindra now has seven R&D centers worldwide. In April 2018, the global IT firm collaborated with long-term client and partner British Telecom (BT) at the Adastral Park research campus, home of BT Labs, to open the first Makers Lab in the United Kingdom. Tech Mahindra has also created labs in four locations across India – Pune, Chennai, Hyderabad, and Bengaluru.

Entellio is a self-learning NLP/AI/ML-based enterprise conversational AI platform designed to replace today's customer interactions. It is a product of Makers Lab innovation efforts. Entellio stands for Enterprise Intelligence Input Output. It is a next-generation solution for customer interactions, which will enable enterprises to provide a superior customer experience to their customers. According to Makers Lab, Entellio provides customer bot onboarding in seconds and derives entities and intents instantaneously from an Excel spreadsheet.



Entellio offers the following capabilities for conversational user interface design and development:

- » Intent and entity creation
- » Graphical visualization and development tools
- » Dialogue manufacturing
- » Built-in support for 12 languages

Released in 2016, Entellio is designed to be a rapid development, cost-effective platform for creating conversational user interfaces.

In addition to working as a chatbot for usual textual needs, Entellio proposes conversational browsing on websites for enhancing the customer onboarding and navigation experience. As websites grow, they tend to get stale and out of date because of links that hide in the background for new or even experienced users. As a result, an integrated navigational experience using natural language processing is the ideal way forward.

Challenges

As stated previously, dozens of technology vendors are offering various kinds of chatbot and conversational interface platforms. In addition, there are a wide range of natural language processing toolkits as well as many deep learning tools such as Caffe, Torch, and TensorFlow. There are also numerous voice and speech recognition tools that are available as open source or as tools paired with smartphone operating systems. Several of these tools are available at a low cost or at no cost, but there is no clear end-to-end path to delivering a robust conversational interface solution.

While we're seeing a rapid evolution in these technologies, there is a general lack of comprehensive integrated tools that can be used to develop a sophisticated conversational interface. Most of the chatbot tools on the market offer rule- or script-based approaches to handle user interactions. Developers create scripts and dialogues that users then interact with per embedded rules. Most often, these systems perform very limited natural language processing to extract noun phrases and identify keywords to determine the best scripted response based on pattern matching. These script-based tools typically don't learn or improve based on the dialogue over time and usually have to be added to or enhanced to provide better coverage.

There are also significant training and expertise challenges facing organizations that are planning on having their own developers build conversational interfaces based on these low-cost or no-cost tools. For example, while many deep learning and machine learning toolkits exist, they are not immediately suitable to conversational interface development without additional development in natural language processing. These general-purpose tools also need to be customized and adapted to handle textual training data. In addition, to use these tools, large training data sets consisting of pre-existing conversations are needed to properly train the machine learning algorithms. For AI to understand context, catalog and domain data needs to be collected, extracted, and organized to provide knowledge bases that can be used to answer questions or make recommendations. Organizations then need to develop question/answer processing capabilities based on these knowledge bases.

From a user interface standpoint, organizations need to understand that their conversational interfaces must provide a high level of accuracy to users (often more than 95%), or they will reject the application. In addition, most organizations or developers aren't familiar with the usability design for this type of interface. These challenges require them to



recognize the significant cost and time commitment associated with developing and deploying a true conversational interface that will be used and liked by customers and employees.

Probably one of the most underrated challenges is that of unrealistic expectations and how much effort is required to achieve this level of conversational interaction today based on the current state of the art in artificial intelligence. While movies and the popular press continue to discuss and promote AI as "general intelligence," only the most advanced tools can provide very good domain-specific conversational interfaces. However, these interfaces require significant time and effort, and even then, they remain very specific and domain focused and will need to be monitored and supported for the foreseeable future.

Conclusion

IDC offers the following specific recommendations to end-user organizations pursuing a conversational AI project:

» Match business outcomes to the capabilities of technology offerings. Organizations should make sure the cognitive/artificial intelligence solution that is chosen will be able to help achieve the desired business outcome and/or address the issues that the technology is intended to overcome utilizing a cognitive/artificial intelligence system such as a conversational AI platform. Great conversational applications require both advanced technology and solid design judgment. The most widely used conversational applications today are built using a similar set of techniques and technologies to ensure both high accuracy and utility.

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Acquire in-house expertise. Engage in-house subject matter experts, the right stakeholders, and consulting partners to help develop the right use cases to align with the desired business outcome. Make sure to include past project experiences in the

organization's design thinking approach and, if available, include predefined use cases that have been developed for peers within the organization's industry to help develop the optimal use cases for the desired outcome. This process should involve continuous innovation and prototyping until the right use cases have been developed.

- Develop requirements. Prior to undertaking any voice or text conversation—enabled application projects, develop requirements around the level of knowledge, interaction, question answering, and tasks that will need to be handled by the application. Consider the following questions:
 - Will the application need to be highly accurate and well-versed within the chosen domain? What languages will it need to support? How flexible in terms of language will it need to be?
 - Who will be working on the project? If the organization is using in-house resources, do they have the right machine learning and data science skills?
 - Does the organization have a historical archive of past conversations that can be used for training? If not, what types of training data will be used?



- » Build the knowledge base. To build a sufficiently capable knowledge base, organizations must collect all pertinent and domain-related information sources. Organizations that have strong content and knowledge management resources will be able to do this more easily than organizations that do not have such resources.
- >> Understand connected systems. Enterprises need to understand how the components of conversational interfaces and related AI platforms will impact conversational commerce in their organization and provide opportunities for new and enhanced business. IT leaders should properly evaluate the opportunity on how to include this new transactional channel going forward.

Conversational AI interfaces based on voice and messaging are the wave of the future. A decade from now, talking and conversing with your applications and devices will seem like an everyday norm. The seeds of that conversational revolution are now germinating. How will your organization and enterprise participate in this new world of customer and knowledge worker expectation? Offerings such as Entellio can provide a platform and the capabilities to deliver conversational applications and user interfaces that meet the needs and requirements discussed in this paper.

About the Analysts



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Ritu Jyoti is Program Vice President, Artificial Intelligence (AI) Strategies with IDC's software market research and advisory practice. Ms. Jyoti is responsible for leading the development of IDC's thought leadership platform for AI Strategies and management of the newly formed AI Strategies research team. Her research will focus on the state of enterprise AI efforts and organizational impact and provide guidance on building new capabilities and prioritization of investment options.



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