

**Artificial
Intelligence**

AI to Better Engage your Digitally[®] Connected Customer



OVERVIEW

Artificial Intelligence (AI) is being considered the next significant technology development, akin to the computer era and the emergence of the smartphone. One of the primary reasons behind this growth is the business revenue potential AI presents.

With nearly 5 billion mobile device users sending 20 billion texts and 60 billion social networking messages each day via apps such as Facebook Messenger, Twitter Direct Message, WeChat and LINE, your customers are more accessible than ever—if you know how to interact with them.

This dramatic shift toward mobile messaging requires a decisive change in the way you provide customer service. Mobile applications popularity is on the increase and is now a top three choice among consumers under the age of 55 for contacting an organization. Conversely, traditional telephone preference has decreased among consumers under the age of 35, eclipsed by social media, mobile applications and web chat.¹

As mobile messaging use skyrockets, so too have user expectations around the contact center's ability to efficiently handle incoming mobile requests. If your business wants to have effective communications with mobile users, it's increasingly clear that you need to do so in a way that integrates seamlessly with their messaging applications.

We'll explore the challenges that need to be overcome, and the key technological capabilities to consider that will allow you to effectively interact with your customers, no matter where they are or what communications platform they use.

While multiple messaging applications provide greater choice for users, they also present a challenge for the contact center since there is no single interface that works across all messaging applications.

Begin your customer engagement digital transformation journey here to learn how you can take advantage of this technology and establish the digital foundation that AI requires.

The Global Rise of Messaging

The growing ubiquity of mobile devices has brought modern communication capabilities to populations that were previously largely unreachable. Text-based messaging use is seeing the highest penetration in leading digital markets, with end users often bypassing traditional communication channels like landline phones, email and Web chat in favor of mobile messaging applications. Although this is sometimes due to limitations in the blending of channels, it is often a representation of consumers desire for a real-time, personalized (and often times contextual) experience.

Text messaging is not a new concept. Consider chat-based messaging systems have been around since the 1980s but did not take off until mobile phones provided a hand-held device that allowed the use of text-based Short Message Service (SMS) communications. Since it was designed to run over existing mobile networks, SMS was also easy for wireless carriers to offer. As a result, text messaging quickly became the preferred communications channel (despite its original 160-character technical limitation and billing charges for messages sent while roaming).

Over time, many different messaging platforms were developed to help mobile users navigate message allocation limits as well as national boundaries and language barriers.

Contemporary messaging applications like Facebook Messenger, Twitter Direct Message (DM), Snapchat, WeChat, LINE and Kik have no character limits or restrictions on the number of messages sent or received. Furthermore, these messaging platforms are able to utilize the user's data services (albeit minimal amounts required), which in turn has encouraged a richer multimedia experience and even greater levels of use.

While multiple messaging applications provide greater choice for users, they also present a challenge for the contact center since there's no single interface across all messaging applications. Additional challenges arise from the growth of multi-national enterprises and the emergence of markets in multi-lingual countries such as Asia, Central and South America, Europe and Africa. The need to address an increasingly diverse consumer base, along with an increase in offshoring of contact centers, has created a challenge for global IT operations.

The Digital Transformation of Customer Service

From IVR to Web

Customer service has evolved considerably since toll free numbers provided consumers with greater access to services. As incoming call volumes increased, interactive voice response (IVR) systems emerged as the primary way of handling growing traffic within the call center.



Initial IVR deployments offered DTMF (touch-tone) menu interaction have been instrumental in reducing the need for live agents to perform routine routing of inquiries. Subsequent advancements in self-service applications, including automatic speech recognition (ASR), have further enhanced the experience. Although IVR's have been effective in meeting the needs of contact centers through improved efficiencies, the expectations for self-service have changed considerably and must evolve to address today's mobile, connected consumers.

Corporate websites have also undergone a shift. Initially positioned as a marketing platform, websites have evolved to become another customer touch point, providing additional communication channels to interact with the business, such as click-to-call or web chat for example.

Contemporary websites and IVR solutions have a number of similarities—both follow a set of pre-configured menus, queues, or forms before connecting the customer with a live agent. Although websites and IVRs are considered to be mature customer service platforms, both need continual evolution to meet the large-scale shift to mobile messaging.

How Messaging is Different

While web and IVR interactions guide the customer through pre-set menus toward a structured experience, messaging oriented engagements are unstructured and allow the customer to more directly influence the experience and set their own individual preferences for how the information—and the outcome—is delivered to them.

Automated Messaging

- Artificial Intelligence (AI)
- Artificial Neural Networks (ANNs)
- Natural Language Processing (NLP)
- Machine Learning

Unlike pre-set IVRs and Web applications, messaging interactions have the potential to provide much richer context about a customer's need, intent, and sentiment. For example, a traditional menu-based IVR application would be ill-equipped to handle every type of customer inquiry that the applications developers did not anticipate. IVRs that utilize more advanced ASR capabilities are limited as well since the extraction of customer intelligence requires the need to first translate the customer's spoken words to text for analysis. In contrast, incoming customer messaging presents the contact center with the consumers "native text" that can provide more precise and reliable information since it does not first undergo a speech-to-text translation.

Just as IVRs and web forms have historically helped to provide information to customers more effectively through self-service, automated messaging applications (often referred to as "messaging bots") are now allowing contact centers to meet the interaction needs of the new generation of mobile messaging users.

The Powerful Technologies Behind Automated Messaging

The effective handling of incoming mobile messaging through automated self-service requires solutions that can leverage several advanced technologies:

Artificial Intelligence (AI)

The global artificial intelligence (AI) market is growing substantially with market research indicating a CAGR of up to 55% from 2017 to 2025. AI is being considered the next significant technology development, akin to the computer era and the emergence of the smartphone. One of the primary reasons behind this growth is the enabling revenue potential that AI is expected to garner through workforce efficiencies and data mining capabilities, for example.

AI is really a collection of techniques developed over the past 50 years to provide a machine-based version of human reasoning. Recent advances in AI enable "system learning" based on automated analysis of customer input data. References to "machine learning" and "deep learning" both refer to specific sub-categories of AI techniques. AI depends on a digital foundation and companies must pursue their digital transformation journey in order to take advantage of this technology.

Artificial Neural Networks (ANNs)

In the field of cognitive science, artificial neural networks are a family of computing models inspired by the functioning of the brain and central nervous system, and are used to produce data estimations when a large number of inputs are unknown.

Natural Language Processing (NLP)

Natural Language Processing is an understanding of written language through an analysis of the syntax and grammar of text-based communications. More simplified language analysis can utilize pattern matching capabilities to identify specific types of data in a text message such as web addresses.

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Machine Learning

Machine learning in particular plays a key role in the automation of messaging solutions by “observing” human agents and consequently expanding the breadth of automated responses based on actual customer interactions.

Enhancing Existing Contact Centers with Cloud Capabilities

Overall, the contact center market is very mature, from both a technological and a business process perspective. Most growth is being seen with enhancements to existing contact centers rather than in new contact center development.

Budget limitations, along with the increasing preference for OPEX (operational expenditure) spending over CAPEX (capital expenditure), are driving the demand for cloud services given the “pay as you go” approach and minimal outlay at the front end of the adoption curve.

Given this shift in investment preference, a cloud-based AI service makes a lot of sense. In considering a cloud solution, proper integration with the existing contact center technology is critical. The integration points for such a service should include:

- **Message Input**—Although the cloud service is likely to provide connectors or gateways to various social media providers, this may not be enough. The enterprise may also have its own message sources, such as Web chat or mobile apps. To accommodate these message sources, the solution should include an Application Programming Interface (API) that the contact center can use to integrate the various message sources.
- **Live Agent Interactions**—Since the service can act as a social gateway, the API should allow the processing of social interactions by live agents including their ability to respond to the social inquiry.
- **Routing And Agent Assignment**—By identifying customer intent, the service can provide useful information for the contact center to leverage in the routing of interactions to the appropriate agent or group based on skills and attributes (both the customer's and the agent's).
- **Agent Desktop**—The service should provide agent desktop markups of the interaction, so the agent can quickly and effectively identify relevant information of the customer journey.
- **Learning Services**—The services should capture interactions by observing the way live agents respond to customers (behavior) and the information they've added (notations, tagging, etc.), training the system for future interactions.

The Importance of Security

Business leaders often raise security concerns about cloud-based services; however public cloud platforms can actually be more secure than private IT infrastructures. For example, a well-engineered cloud platform provides enhanced credentials capability, which enables an application to request temporary credentials through an API rather than storing the credentials in a file. Since the credentials are not actually created and stored, a hacker is prevented from accessing resources.



Learning requires data so any approach that uses learning-based AI algorithms must store interactions for future use. It is important, however, that this data storage is done in such a way as to preserve the privacy of the customer (and possibly the agent). Clearly, some information

in a message may be sensitive and must be hidden before the data is saved. At the same time, removing too much information could render the message useless for purpose of training AI algorithms. Sensitive information needs to be hidden in such a way that the message can still be used for learning purposes.

Necessary Capabilities

A robust feature set is important to make any AI or messaging service effective and useful. Give strong consideration to the following capabilities in any automation solution you consider:

- **Social Gateways**—The solution should provide gateway services that automatically interface to the required channels and do so without the need for the contact center to develop special software or hardware to support message send and retrieval. Such a gateway could retrieve public Twitter posts that mention the company name, for example, and then send responses in the form of a private Twitter Direct Message (DM) to the sender.
- **Social Profile Identification**—Through the integration with social channels, such as Facebook and Twitter, the solution should acquire customer profile information that can be used to enrich the personalization and accuracy of the customer's automated experience, as well as provide additional insights for any subsequent agent interactions.

Necessary Capabilities

- Social Gateways
- Social Profile Identification
- Multi-Language
- Language Identification
- Text Automation
- Intent Classification
- Pattern Matching
- Sentiment Assessment
- Entity Detection
- Directed Dialog
- Agent Display Markup
- Contact Center Integration
- Outbound Messaging
- Reporting and Analytics
- Secure Data Persistence

- **Multi-Language**—There should be support for multiple languages and character sets. At minimum, the solution should be able to process messages in the following languages:

English, Chinese, Portuguese, Spanish, Arabic, Russian, Japanese, German, French and Thai.

In addition, the solution must handle multiple (or mixed) character sets. For example, the ability to read a message in simplified Chinese that contains an airport code represented in the Latin alphabet.

- **Language Identification**—Processing of a message first requires identifying the language, because the country of origin or message source alone does not provide sufficient information. For example, tweets or Facebook posts originating in the U.S. could be in any language, such as English, Spanish or Chinese, for example.
- **Text Automation**—Once the language of a message has been identified, the solution can look at how live agents have previously provided an appropriate response to similar messages. The automated service learns from thousands of previous messages that were answered by live agents. Look for a solution with the ability to provide an automated response to a fairly high proportion of messages based on learning from past interactions.
- **Intent Classification**—The solution should classify the interactions according to the type of intent or inquiry. For example, the service may conclude that a message is about a lost credit card, and route accordingly. The solution should be able to learn to classify the messages using sophisticated machine learning techniques through identification of the intent.



I would like to fly from **LAX** to **EWR** on **2/3**. My credit card is **XXXXXXXXXXXX0389** and my frequent flier number is **FF34282**.

In this message, there are five identifiable entities:

- The origin airport code, **LAX**.
- The destination airport code, **EWR**.
- The date, **February 3**.
- The credit card number **XXXXXXXXXXXX0389**.
- The frequent flier number **FF34282**.

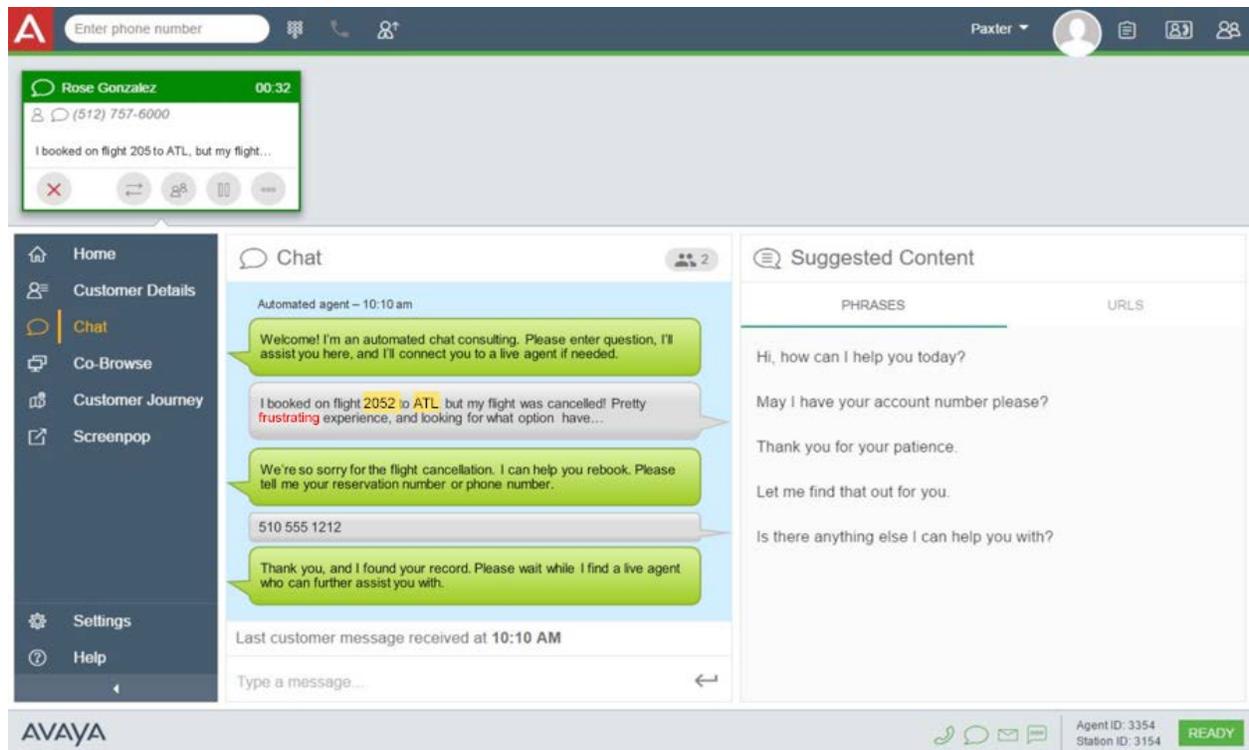


Figure 1 - Agent display example

- Pattern Matching**—When first deploying a solution, the contact center may not have accumulated enough past data to be able to train the system to formulate a response or decide the customer's intent. In such cases, a pattern matching approach can provide initial automation until more data can be collected. For example, an airline application may decide that the message is about a cancelled flight if the message contains the word "cancelled."
- Agent Display Markup**—Agent display markup highlights key pieces of information such as entities and sentiment in a message on the agent's desktop. In doing so it can improve the efficiency of the agent by making it easier to spot key information. Figure 1 shows an example of how the solution might highlight the flight number and airport code entities, along with words that indicate sentiment.
- Sentiment Assessment**—The solution should be able to assess the sentiment of the customer, either positive or negative, and assess a numerical score or qualitative value that covers the range from negative to positive. The sentiment assessment can then be used to make routing and agent assignment decisions. This information can then be included in the agent desktop.
- Entity Detection**—Detection and identification of entities—account numbers, flight numbers, airport codes, and dates—in the text is also an important capability to provide the context of a customer journey. The solution should be able to detect one or more entities within a message to provide the personalized service expected. For example, consider the following message:

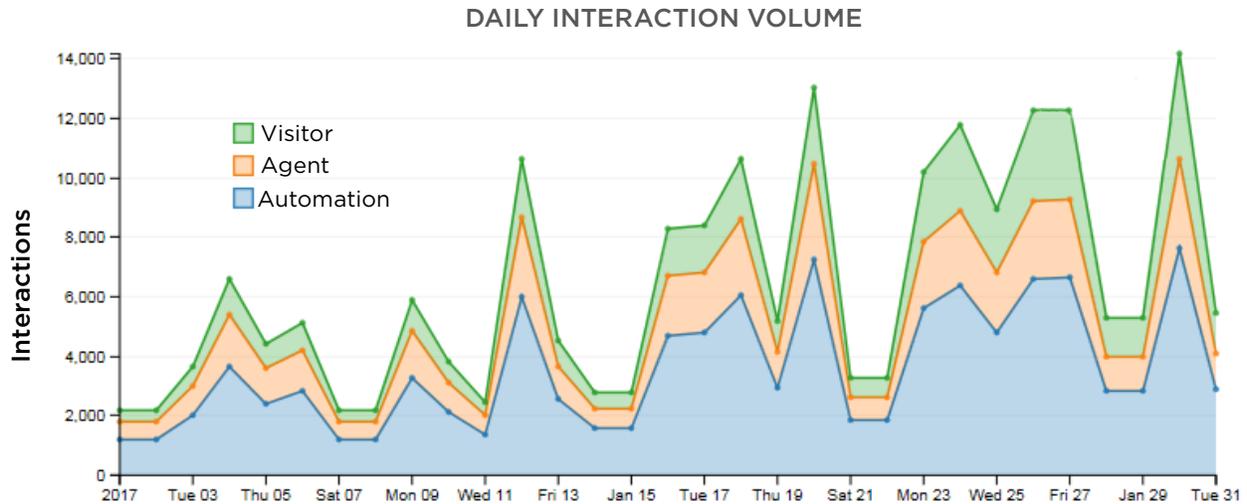


Figure 2 - Example time series graph of interaction volume.

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These entities can be identified and used to guide further dialog with the customer through an effective communication channel.

- Reporting and Analytics**—The preferred solution should provide metrics and reports that yield insights into the effectiveness of message handling. For interaction processing to be successful, the enterprise must be able to measure, report on, and analyze its performance. At the most basic level, the contact center needs to know how many messages were received from customers, how many replies came from automation, and how many replies came from agents. Figure 2 depicts a time series chart showing the total number of messaging interactions, broken down by source such as: visitor (customer), agent, or automation.
- Directed Dialog**—Directed dialog guides the customer through forms that collect a predefined set of transaction fields. For example, a credit card balance inquiry might ask for the credit card number and then ask two security questions. As with an IVR tree, the answer to one question could influence later questions. In the credit card example, the directed dialog might first ask if the user has a PIN. If the answer is yes, then the next question would ask for the PIN number. Otherwise subsequent questions would ask security questions.
- Contact Center Integration**—The solution should provide seamless integration with existing contact center systems. This capability could be implemented through a message queue interface such as Amazon Web Services (AWS) SQS (Simple Queue Service), and would have two parts:
 - Visitor API - Enables the contact center to redirect incoming customer messages to the messaging automation service. This interface could be used for SMS, Web - and App - chat messages, for example.
 - Agent API - Allows the service to interact with the contact center to enable agents to handle customer messaging interactions.

The global shift to mobile messaging presents the modern enterprise with a unique set of challenges and significant new opportunities for growth and improved customer service.

- **Outbound Messaging**—In addition to handling incoming customer messages, a well-engineered solution should also initiate messages to customers. An outbound capability can automatically and proactively update a customer with resolution status of a service request through proactive alerts that require an action, for example. The interaction can transition a customer request that originates on one channel, such as voice, and send it to a messaging channel, further enhancing the experience.
- **Secure Data Persistence**—As mentioned previously, the solution needs to save conversations for future analysis, but messaging interactions could contain sensitive information. For this reason, the service must be able to hide or obscure sensitive information in the messages by, for example, anonymize (hiding sensitive names and information) and redacting (obscuring sensitive information before feeding to AI or machine learning). It is important that the methods used to hide sensitive information should be sophisticated enough not to render the remaining data useless for analysis.

Integration with the Customer Journey

Today's consumer expects more than just competent execution of individual interactions. They expect a business to know about their engagement "journey"—in other words to know what they have experienced, to anticipate what they want, and to guide them through upcoming transactions.

For example, if a customer makes an airline reservation they might expect to receive confirmation and check-in reminder notifications.

They might also expect to receive a notification if a flight is delayed or cancelled, and if they seek customer service, they will expect the people and systems they interact with to know their flights and itinerary.

This example highlights the need for a platform that can manage interactions throughout the entire customer journey. The journey started when the customer booked the trip, and continues beyond when the trip is completed. The customer journey represents the relationship with the customer and continues indefinitely. Throughout the customer journey, the platform maintains the context of all interactions. The preferred service will leverage this context seamlessly for future interactions.

Conclusions

The global shift to mobile messaging presents the modern enterprise with a unique set of challenges and significant new opportunities for growth and improved customer service. As more customers communicate via text messages and messaging applications, successful contact centers will need to embrace automated messaging solutions in order to meet the needs of a population that largely communicates on the go.

An effective automation service is a critical component of the modern contact center, and should be able to perform most contact center automation functions via messaging interactions. The desired automation service will use machine learning and artificial intelligence to provide



The preferred service will leverage context from the customer journey towards future interactions.

automatic responses to messages, capture information from a message, perform directed dialogs, and classify the language and intent of a message. In addition to providing a seamless interface to the contact center, any solution being considered should also supports multiple languages and character sets.

Avaya AVA™ is a cloud based AI solution which provides social messaging integration and automation of digital interactions, leveraging Chat Bot and Natural Language Processing (NLP). With tight integration to Avaya Oceana™ solution, Avaya delivers a single integrated omnichannel experience for servicing the needs of your entire customer engagement strategy—enabling the delivery of exceptional personalized customer experiences. Avaya will give your business the ability to quickly innovate in response to dynamic customer expectations and provide the adaptability to connect and integrate third party technologies for optimal effectiveness.

To learn more about Avaya customer engagement solutions and related services visit us at [Avaya.com/Ava](https://www.avaya.com/Ava) or contact a representative today.

About Avaya

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