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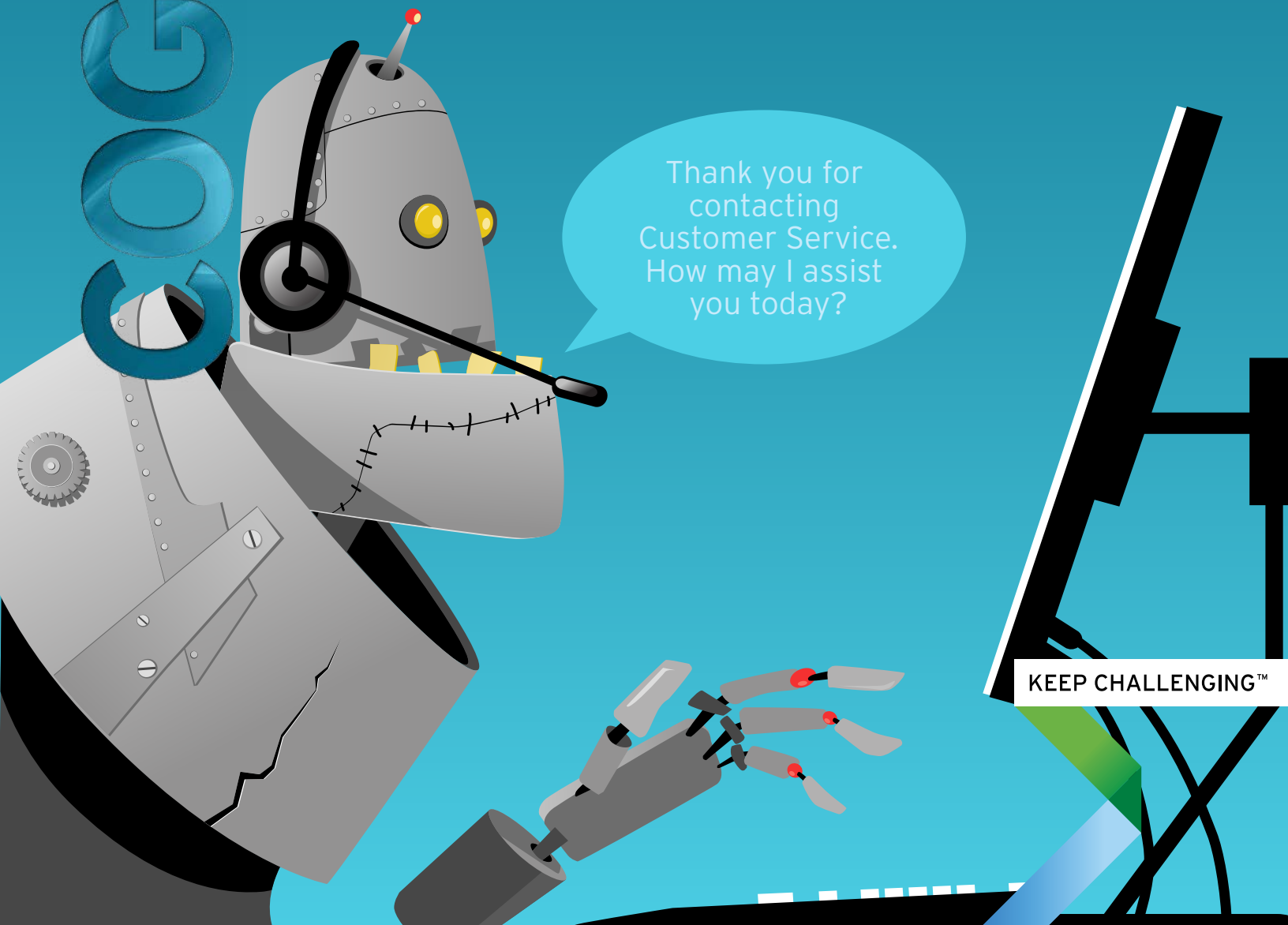
The Chatbot Imperative: Intelligence, Personalization and Utilitarian Design

Chatbots don't need to impersonate humans; to boost business outcomes and deliver superior experiences, they must quickly deliver responses that speak directly to individual human needs and continuously learn so they can apply meaningful responses to these unique requirements over time.



KEEP CHALLENGING™

Executive Summary

Chatbots are taking the tech world by storm. This technology – which helps humans converse with computers in their native language via a computer interface – is gaining popularity in a variety of scenarios, especially customer service. The rise of messaging apps, the explosion of the app ecosystem, advancements in artificial intelligence (AI) and cognitive technologies, a fascination with conversational user interfaces and a wider reach of automation are all driving the chatbot trend. Alhough these factors are propelling the current interest in chatbots, however, the current hype around this phenomenon may not prove to be sustainable over time without a stronger business rationale and better near-term results.

One issue with chatbots' future viability is developers' focus on enabling more natural and human-like conversations with users. This is a lofty goal, given that AI is not yet able to deliver on the promise of natural language processing (NLP). Because most chatbots still use retrieval-based deep-learning models instead of generative ones, users are aware they are interacting with a machine.

Another issue is that, over time, chatbot novelty will wear off. When that occurs, users' utmost concern will be how well the bot can get things done. For example, Tencent's WeChat has pioneered the use of a messaging platform to order, purchase and pay for products and services. The main reason WeChat is very popular in Asia, especially in China, is that it brings almost every service into the messenger without the need to leave the WeChat app. It achieves all of this through embedded mobile websites rather than an army of chatbots.

To make chatbots effective, we suggest keeping the design simple, and "conversation" to a minimum. We recommend creating utility bots that specialize in specific tasks, provide recommendations to users and excel at helping users complete those tasks. Rapid, contextual responses will be key to improving outcomes. Over time, bots will evolve from being

systems that perform rote and repetitive tasks, to those that learn over time and can offer personalized interactions with recommendations. This will be possible through their ability to access data, process it and respond quickly, using technologies such as neural networks and machine learning.

Self-learning algorithms and graph databases can help machines comprehend larger representations of data by making it easier to understand what users are referring to without ambiguity. To speed and streamline retrieval, it is important to dynamically update these semantic graphs, which store data types and their relationships. This is key to improving response quality.

Effective chatbots will demonstrate an understanding of user needs and complement these needs with quick access buttons and images that depict the options available. By incorporating these visual aids, chatbots can reduce the time and effort spent on interacting with the chatbot, resulting in a quality user experience.

This white paper examines the drivers behind the rise of chatbots, what is needed to sustain interest in this technology and how chatbots will evolve. Furthermore, we deconstruct the design elements needed to deliver an exemplary experience for tomorrow's chatbot users.

Chatbots on the Loose

We are on the cusp of change, with some pundits such as the World Economic Forum predicting that the mainstreaming of bots will usher in the next industrial revolution.[1] As the chatbot ecosystem takes shape, we see specialized chatbots emerging to address various user needs. In fact, Facebook boasts of 33,000 bots developed in just a few months of the launch of Messenger.[2] Here are some of the ways chatbots are being used:

As the chatbot ecosystem takes shape, we see specialized chatbots emerging to address various user needs.

- **Customer service:** Most chatbots provide shopping assistance and product recommendations. After launching its Bot Shop a few months ago, mobile messaging app Kik now has thousands of bots in the store.[3] Almost all major brands are said to want a chatbot of their own.
- **Scheduling:** Buying plane tickets, booking movie tickets and setting up meetings – these are tasks that chatbots can easily complete. For instance, Alaska Airlines' virtual assistant "Ask Jenn" helps with ticketing and customer service.
- **Status checks:** These include apps that report on the weather, local events and the news – basically everything you need to know from the Internet. Examples include Telegram's weather bot and CNN's chatbot for news.
- **Entertainment:** Bots can also deliver entertainment by offering random quotes, funny videos and jokes, such as Google's Allo.

As bots proliferate from the likes of Facebook, Amazon, Slack, Kik, WeChat and many others, it is important to examine the growth of this phenomenon. Doing so will provide clues to whether the bot revolution will continue in its current form or evolve into something different.

The Rise of Chatbots

With the digital revolution, there is little doubt that chatbots are moving mainstream. The movement is believed to have started as early as 1950 with Alan Turing's intelligent machine, followed in 1966 by ELIZA,[4] an intelligent agent that could conduct near-convincing human conversations. Even though advances in the technology continued throughout the '70s and '80s, chatbots did not truly take off until recently.

The rise of bots can be attributed to a number of forces working in parallel:

- **Widespread use of messaging apps among the younger generation.** WhatsApp hit the one-billion user mark in 2015.[5] One-to-one messaging apps have surpassed the usage of social networks. This is seen to be the single biggest contributor to the rise of chatbots. Messaging apps are now platforms, and the phone is a messaging device.
- **Overwhelming app proliferation.** Despite the thousands of apps available today, users are overwhelmed by app volumes. This does not mean that apps will give way to chatbots, however; we all have a handful of apps we rely on and tap every day.
- **The ascension of conversational interfaces.** Facebook's annual developer conference F8 in 2016 reinforced excitement around conversational interfaces[6] – the idea that people want to converse with businesses through machines (desktops, mobiles, etc.) in a human-like manner. Facebook also revealed the innovative idea of structured templates, which extends the conversation with bots beyond just plain text and into images with clickable areas.
- **The maturation of AI and related technologies.** The AI market – including machine learning, natural language procesing, image recognition and speech processing – is expected to reach $5.05 billion by 2020, growing at a CAGR of 53.65% between 2015 and 2020.[7] After an investment of $2.4 billion into AI startups in 2015, over $1.5 billion has been pumped into the market in the first half of 2016 alone.[8]
- **Focus on the customer experience.** Servicing customers over the phone has been plateauing for a while in recent years, as businesses try new ways to improve the customer experience and lower costs. Many customers find it annoying to call the contact center for simple tasks that can be executed with minimal assistance. While businesses have been working to simplify this process, it is still time-consuming. Chatbots can ensure seamless assistance is available at any time of day.
- **The need to streamline operations.** From streamlining call centers to creating mobile apps with self-help options, much thought and technology has gone into improving customer service. But most of these solutions still involve human intervention. The focus now is on finding ways to bypass human intervention altogether. Chatbots can fulfill this goal as they can handle simple problems and act as the first point of contact between the user and the business.
- **Wider reach of mobiles and messenger apps in developing countries.** In emerging economies such as India, mobile apps and commerce have leapfrogged conventional e-commerce. In many bandwidth-constrained villages and small towns, messenger apps are the medium for communication, collaboration and commerce. Chatbots designed to work in these conditions will propel their growth in emerging economies.

Most of the above are consequences of the digital world. Digital makes 24x7 engagement possible, giving chatbots their *raison d'etre.* Digital technologies provide the infrastructure for chatbots to live and prosper.

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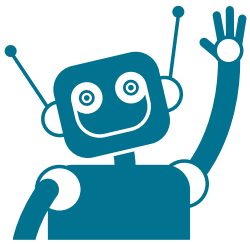
The Current Hype Is Not Sustainable

Most of today's technology exploration focuses on enhancing features and improving functionality to enable chatbots to mimic human responses and engage in a more natural, intelligent conversation with users. Despite the merits of this work, we believe the continued success of chatbots will not wholly depend on their ability to conduct a natural conversation.



Consider the fact that text messaging has existed for more than two decades, and commercial SMS started in the 1990s. The '90s also ushered in the iconic AOL chat rooms, which were, again, based on the concept of instant messaging. When the social boom hit a few years later, texting (and instant messaging, to a certain extent) seemed to have run their course. Social sharing and enterprise social became buzzwords. Since then, virtual chatting among humans has emerged as a way to build relationships. With chatbots, however, once the novelty wears off, such interactions are unlikely to be about relationship building.

The attempt to manufacture emotions — be it remorse, happiness, pride or frustration — can result in a negative experience for users who attempt to work with machines that try to emulate humans.

Attempts to humanize chatbots can also give rise to what has been termed "the uncanny valley": the theory that humans' emotional response to a robot quickly turns negative when the robot appears "almost" human.[9] The same theory can be applied to chatbots, many of which now swing between being an intelligent machine and acting human. The attempt to manufacture emotions — be it remorse, happiness, pride or frustration — can result in a negative experience for users who attempt to work with machines that try to emulate humans.

Microsoft's Tay, an artificial intelligence bot, was criticized for racist tweets just a day after it was launched,[10] and the company suspended the bot to make refinements. After all is said and done, humans can sense when they are interacting with a machine, and any attempt to make it appear more human rather than intelligent will not result in the expected outcomes.

Another consideration with chatbot-based customer service is the effort it will take to explain complex problems. Chatbots can be very useful for problems that are clear, easy to articulate and straightforward to solve. Problems that are difficult to explain to a human at the other end of a phone are even more difficult to explain to a machine over chat. Most chatbots today are programmed to ask users to repeat their question, paraphrase it or simply try again. Being repeatedly asked to rephrase can result in user frustration.

The Value of Chatbots: Utility and Personalization

Think of the origin of the ATM. In their initial days, these machines didn't pretend to be intelligent. They didn't try to engage users with small talk, and they never tried to impersonate a friendly banker. In short, ATMs did what was needed — address consumers' financial needs 24x7. The same is true for office coffee vending machines and many other gadgets.

Over time, chatbots will mature along the following lines:

- **Next-generation chatbots will become increasingly utilitarian.** The term "utility" in this context means something we find so useful that we turn to it on a daily basis without hesitation. The focus would be on improving the competence of the chatbot — after all, a chatbot that is all talk and no substance and fails when given a complex task will not be sustainable.

- **In the bot world, first-contact resolution will become a key performance metric.** Chatbots that can provide solutions on the first instance, without the need to paraphrase or explain the problem in greater detail, will leave other bots in the cyber dust. This capability is particularly important to the millennial generation, which is the poster child of the chatbot revolution and geared toward instant gratification. The bot's ability to respond to user commands or queries in the shortest amount of time and best way possible will enhance the utility of the chatbot.
- **Successful chatbots will work to understand an individual over a period of time, learn the nuances of the user's requests and improve first-contact resolution.** The ability to personalize responses will determine the quality of the larger customer experience. The chatbot must build a relationship with users based on an understanding of their needs rather than provide a generalized set of responses that it is trained to deliver.
- **Increased focus will be on the underlying data ecosystem, including the ability to pull and leverage data from a variety of sources, both within and outside the enterprise.** A key capability will be to link data from these sources and create and leverage graph databases.[11] The faster the chatbot accesses, processes and responds to data, the better the overall experience will be.
- **Chatbots will become more specialized.** Users need to know what the chatbot does and does well. Chatbots such as the one produced by x.ai,[12] for example, perform just one specialized function: scheduling meetings. Even top voice assistants such as Siri and Cortana do not excel at everything; they just happen to do a few things well. It is up to the user to discover what the chatbot can and cannot do through the process of trial and error.
- **As bots become more specialized and popular, they will proliferate; managing them could become as overwhelming as managing apps is today.** We see this solution in the form of a master bot. A master bot, or "bot of bots," would act as a personal assistant, getting things done on behalf of the user. That would mean calling other bots to complete tasks. The master bot would know which bot to call for a particular task and instruct the bot to return results to the user.

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The best bot experience is one in which humans get what they request and need. As Figure 1 illustrates, bots will move slowly in that direction.

The Bot Evolution

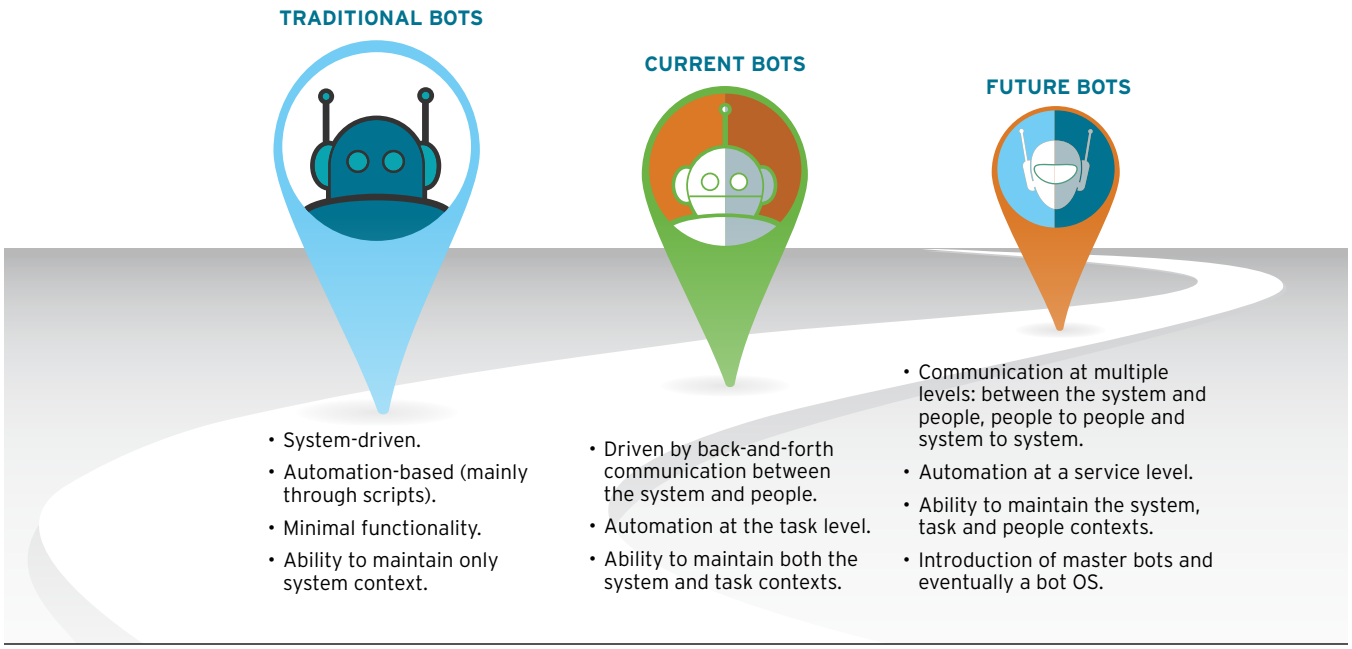

Figure 1

Key Design Elements

Businesses must start designing for the coming bot age. This means taking a peek into the future and designing bots to work in today's context. This involves many considerations, such as bot/human interaction and interface design. The following are some of the key design elements:

- **Reduced manual effort.** One key element of future chatbot designs will be the reduction of the manual effort required for human interaction. This would essentially mean completely removing or at least reducing the number of touches, keystrokes or mouse clicks required to help the bot determine the best solution to the problem. One way to achieve this is to make sure most of the options are provided by the chatbot itself, with the user just needing to select the right option. This would greatly reduce the time and effort required to interact with the chatbot. It would also help the chatbot respond to users who prefer using abbreviations or shorthand in their mobile-based chats. Another approach is to use visual interactive voice response (IVR)-like images.[13]
- **Ability to predict the right options.** In order for the system to display clickable options for users to choose from, the right options need to be predicted from a set of choices. This requires the system to understand the user's problem well enough. The goal would be to decipher the problem with the least number of questions and manual effort from users, which requires an emphasis on understanding the user's background and the context of his or her interaction.
- **Personalization.** This leads to one of the most important design decisions: How much personalization can be brought into the interaction itself. For instance, can the system remember user profiles, previous interactions, the interactions of other users in the system, the current context and the environmental know-how? Each of these attributes needs to be understood in conjunction with the others to really understand users and what they might need now. Figure 2 provides an illustration to better understand this concept.

The Basis of Responses

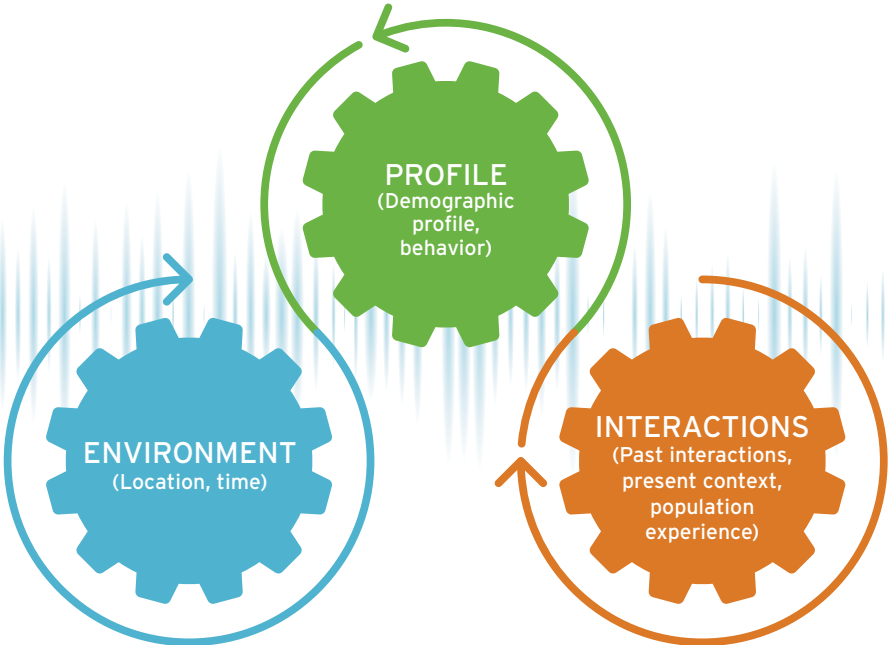

Figure 2

Because repeatedly asking users to rephrase a question or try again would be a sure path to frustration, the chatbot needs to demonstrate a partial understanding to reveal which part of the question it doesn't understand.

- **Determination of the best approach for unresolved queries.** Another important design choice is the course of action to take when users don't provide expected responses or if the chatbot is unable to understand or resolve the intent of users' context or conversation. The design here is slightly tricky. Because repeatedly asking users to rephrase a question or try again would be a sure path to frustration, the chatbot needs to demonstrate a partial understanding to reveal which part of the question it doesn't understand. For example, "I understand you might be interested in xxx, and I can help you, but what do you mean by yyy?" Here, xxx is what the chatbot has understood, and yyy is the phrase that has not been previously encountered. Asking to explain the unknown alone can lead to better results.
- **User recommendations.** If users are unsure of what they are asking for — or if the conversation goes into a loop that makes exiting difficult — one resolution is to provide recommendations for users to get started and getting the bot to a more useful state. Recommendations can help first-time users understand what the chatbot can help with, and also help ease the conversation. An example is Google's Allo messaging app.[14]

Looking Ahead to the Bot Future

Entering the chatbot market is fairly easy to accomplish today. Businesses can quickly design and deploy a rudimentary chatbot and develop a community following. An example is Facebook's Messenger, which provides the tools and the market for those looking to develop and deploy a chatbot. In reality, however, no bot has actually become known for its extraordinary capabilities.

Almost all the bots in use today have failed to live up to the hype and expectations surrounding them, in part due to slow technology advancements. The reason bots exist is that businesses want to reach people where they spend most of their time, namely messaging apps such as WeChat. Companies in Western economies have been trying to create something similar for quite some time. Facebook's recent moves[15] might indicate that it is attempting to ramp its revenue model. It is a tested model, and only time will tell how soon it can be replicated, providing it can work in other, more open economies.

At the same time, it is important to remember there are other ways of reaching users on messaging apps, and that WeChat is just one primary example. Developers must get inspired and assemble experiences with bots at the center of the action rather than as a technological adventure.

The future of chatbots will pivot around their ability to become useful, maybe even indispensable, to human beings. How well does the bot know the user? How well does it know what the user needs? Can the bot of the future be a master bot that assists, advises and continuously learns about the user? Can it be intelligent enough to become wiser but never cross the line by pretending to be human? Stepping into the uncanny valley is not the goal — supporting users and making their lives easier is.

Footnotes

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