Business Horizons (2024) 67, 453—459

Available online at www.sciencedirect.com

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GUEST EDITORS' PERSPECTIVE

# Written by ChatGPT: AI, large language models, conversational chatbots, and their place in society and business

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## 1. The chatbot craze: How did we get here?

Chatbots built on large language models (LLMs) are transforming how we interact with computers and the way businesses operate and interact with their customers. These sophisticated AI models, trained on massive datasets, grasp complex language structures, context, sentiment, and nuance to generate human-like responses.

The current excitement about LLMs started in November 2022 when ChatGPT was released into the wild. However, chatbots have a much longer and interesting past. As we introduce this special issue, we begin with a brief sociotechnical overview of the evolution of chatbots and their ability to simulate conversation with people.[1]

Next, we give an overview of the contents of this special issue, which starts with present contributions that address the general benefits and challenges of using LLMs, as well as the ethical considerations that must be considered when deploying them. Articles that concentrate on specific functional areas are also included, as well as research that shares insights into how LLM implementations can change various industries. We conclude with a short discussion of what the future might hold and a call for future research on 10 topics related to LLMs and chatbots.

## 2. The evolution of chatbots

Chatbots first entered the world stage in the 1960s at a time when IT inventions were about transforming science fiction into fact. Technologists turned fantasies into realities, and within a decade, we witnessed the first industrial robots, cordless phones, satellites, and even a trip to the moon. At the same time, many social scientists and innovators considered how people and devices would coexist and communicate in the future.

### 2.1. 1960s: Chatterbots are born

The focus on natural language in human-computer interaction (HCI) was first demonstrated when

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[1] In his "Brief history of chatbots," Osuch reviewed many articles written about the evolution of chatbots for Botsplash. He differentiated between the early history of chatbots (i.e., 1960s-1990s) and the later history of chatbots from the 2000s and beyond. We are grateful for Osuch's permission to adopt the logic and the examples of his summary for our short description of the evolution of chatbots.

https://doi.org/10.1016/j.bushor.2024.06.002

Joseph Weizenbaum developed ELIZA (which he called a chatterbot) at the MIT Artificial Intelligence Laboratory in 1964 (Toloka, 2023). Of course, given what we observe today, ELIZA was powerless. It merely relied on matching the pattern of a query entered by a person with a scripted computer response. All context was missing, and the program did not really engage in language understanding. Indeed, Weizenbaum's (1976) original intention was to demonstrate how superficial the communication between people and machines would be. Interestingly though, people put much more faith into their conversations with ELIZA than expected. Much to Weizenbaum's surprise, they confided their deepest secrets to ELIZA and trusted the program's responses even in the context of psychotherapy. This further fueled the discussion of whether machines could, at some point, replace the human intellect that Alan Turing started with his *Imitation Game* in 1950.

### 2.2. 1970s: Chatterbots become emotional

Fast forward to 1972, when Stanford University psychiatrist Kenneth Mark Colby developed Parry, a system designed to simulate the typical responses of a paranoid schizophrenic. While Parry was able to analyze a person's utterances with a set of assumptions more effectively and match these with emotional responses, its capabilities were still very limited. For instance, Parry was not able to learn from the conversational input.

### 2.3. 1980s: The AI winters

What became increasingly obvious was a need to advance artificial intelligence (AI) and the ability of machines to learn to improve conversational chatbots. However, many of the promises for the quick advancement of AI turned out to be premature and overinflated by developers and the media, which led to disappointment by users. Investors shied away from AI and during the first winter of AI from 1974—1980, investments and research dried up. A few chatbots were introduced after this period (e.g., Jabberwacky), but they were not significant improvements, leading to a second winter of AI from 1987—1993. During the second winter, investments in technology dried up but research remained more active.

### 2.4. 1990s: The AI renaissance

As cybernetics and neural networks matured and investors became interested in AI again, many chatbot systems were developed. In the AI renaissance of the 1990s, these were increasingly deployed to interact with users in online applications. Michael Mauldin developed TINYMUD, a multiplayer real-time virtual world in which players preferred to interact with the chatbot—this was the first time the term was introduced—rather than with other players. Since then, chatbots have become more prominent and influenced more online consumer interactions with organizations. As Osuch (2022) pointed out: "What began as simple programs designed to carry basic conversation based on command prompts were now becoming advanced computation systems, natural processing languages, and artificial intelligence."

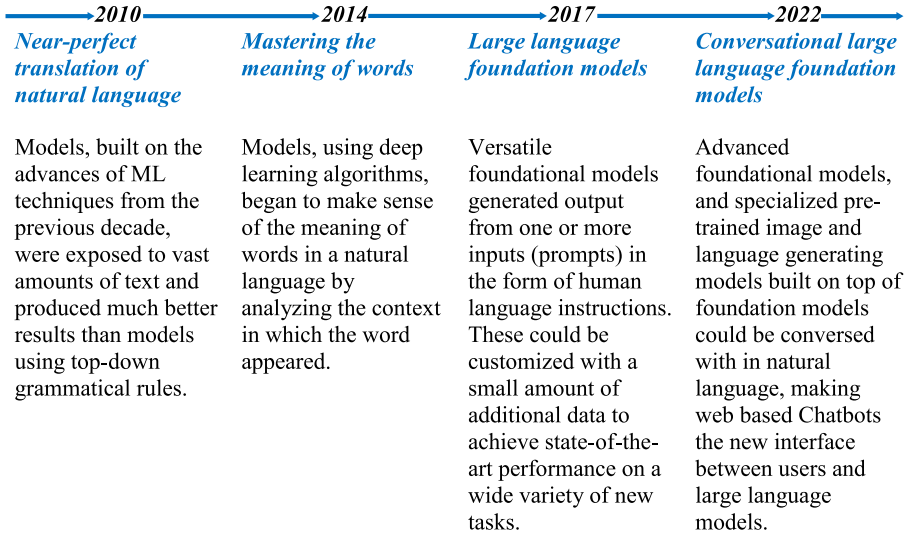
### 2.5. 2000s: The chatterbot challenge

The turn of the century saw significant developments in the chatbot space that laid the foundation for the development of chatbots as we know them today. The Chatterbot Challenge was launched in 2001 as a competition for developers to create chatbots that could carry on a conversation with a human judge for 5 minutes. As a result of this attention to language-based HCI, several new chatbot companies launched, and chatbot providers made it easier for firms to create and deploy chatbots on their platforms. However, these chatbots were primarily rule-based, meaning they followed a predefined set of rules and responses. Nevertheless, the developments in this decade paved the way for more sophisticated chatbots in the years that followed.

### 2.6. 2010s: Chatbot boom

After rule-based chatbots, the field of chatbots evolved to incorporate more sophisticated machine learning (ML) and natural language processing (NLP) techniques (see Figure 1). In 2010, Apple introduced Siri, a virtual assistant that could answer questions and perform tasks using voice commands. While it was initially based on a rule-based approach, it has since incorporated more sophisticated ML and NLP techniques (Kietzmann et al., 2020; Paschen et al., 2020). Around this time, NLP researchers discovered that models exposed to vast amounts of text produced better results than models using top-down grammatical rules, and in 2014 researchers were able to analyze the context in which the word appeared. Advances around 2017 resulted in language models that could serve as a foundation for customization and were able to ingest an incredible amount of data; once created, these models could be customized

**Figure 1. The evolution of chatbots and LLMs since 2010**




Note: Adapted from Gartner (2023)

using a small amount of additional data to achieve high levels of performance on new tasks without having to ingest more data (Gartner, 2023). From there, the race was on to provide the public the ability to tap into these models.

### 2.7. 2022 and onward: The explosion of LLMs and conversational chatbots

In the last few years, the size and accessibility of LLMs capable of understanding and generating human language via deep neural networks have exploded. The ability of these models to analyze and summarize different texts online fueled the development of more effective digital search tools. Pretrained models and conversational chatbots like ChatGPT became publicly accessible and quickly proved they could generate relevant and coherent responses throughout a conversation in several areas. As these models emerged, so did interesting and important technical, social, and organizational issues and questions.

## 3. Overview of this special issue

Our special issue is organized into three sections that address developments in this current evolutionary step.

### 3.1. LLM and chatbot developments

The opening article by Berthon et al. (2024), "Trajectories of AI technologies: Insights for managers," extends our chatbot timeline by presenting a trajectories of technology (ToT) framework to explore the disparate paths that AI and its present incarnation in chatbots have and will take in the coming years. The ToT framework provides managers with a conceptual tool to strategically plan for the enormous promises and perils of AI in general and chatbots specifically.

### 3.2. General organizational considerations

We move forward and introduce articles in this special issue that highlight the various ways in which chatbots are being used in the business world today. We begin with general articles relevant to all organizational applications of chatbots.

In "Beware of botshit: How to manage the epistemic risks of generative chatbots," Hannigan et al. (2024) present a cautionary tale of how chatbots can produce inaccurate or fabricated content, referred to as *hallucinations*. When humans use this untruthful content for tasks, it becomes what the authors call *botshit*. This article focuses on how to use chatbots for content generation while mitigating the epistemic (i.e., the process of producing knowledge) risks associated with botshit.

The third article, "A framework of diversity, equity, and inclusion safeguards for chatbots" by Abdelhalim et al. (2024), highlights chatbot issues related to diversity, equity, and inclusion (DEI). This article presents a series of chatbot examples and discusses their associated DEI implications.

From the cases reviewed, the authors extract a framework of safeguards for those involved in developing chatbots or managing their use to ensure that chatbots support rather than weaken organizational DEI initiatives and strategies.

In "Game changers: A generative AI prompt protocol to enhance human-AI knowledge co-construction," Robertson et al. (2024) focus on the intricacy of appropriate prompt engineering to optimize the learning process underlying these LLMs. The authors concentrate on an active engagement process in the human-AI co-construction of knowledge as a foundation for the AI prompting protocol they present. The goal of this protocol is to empower business managers and their teams to construct effective AI prompts and validate responses, thereby enhancing user interaction, optimizing workflows, and maximizing the potential outcomes of AI chatbots.

In a similar vein, Retkowsky et al.'s (2024) article, "Managing a ChatGPT-empowered workforce: Understanding its affordances and side effects," proposes that while employees are using chatbots as private knowledge assistants in many aspects of their daily work, it is difficult for managers to see and understand the impact within their organizations. The article is grounded in a qualitative study of 50 employees' experiences of interacting with ChatGPT. The authors identify six general organizational applications and associated issues and offer guidance to managers in transitioning to a ChatGPT-empowered workforce in a way that navigates those side effects.

In "Navigating the challenges of generative technologies: Proposing the integration of artificial intelligence and blockchain," Brewer et al. (2024) present blockchain technology as a complementary technological safeguard to address some of the challenges associated with LLM's potential to replace human roles and with AI misuse. They emphasize blockchain's role in promoting transparency, verifiability, and decentralization in AI development and usage, thereby offering potential solutions for four distinct challenges: (1) AI toxicity, biases, and hallucinations; (2) AI interest misalignment; (3) AI as a black box; and (4) AI misuse.

The last article in this section, "From HAL to GenAI: Optimize chatbot impacts with CARE" by Feng et al. (2024), examines GenAI chatbot business applications and their impact across macro, meso, and micro levels of organizations. The macro level explores how GenAI chatbots reshape industry dynamics, the meso perspective delves into organizational changes, and the micro lens focuses on enhancing individual productivity, learning, and creativity. In response to respective risks that emerge in terms of matching, ethics, technology, and adaptability challenges, the authors introduce a human-centric CARE framework—collaboration, accountability, responsiveness, and empowerment—to mitigate the risks and optimize the impact of GenAI chatbots.

### 3.3. Specific business functions

The second section of this special issue focuses on how advanced chatbots, and LLMs in general, have a wide range of applications across specific business functions.

In customer service, chatbots can handle inquiries and provide support 24/7. In "The paradoxes of generative AI-enabled customer service: A guide for managers," Ferraro et al. (2024) highlight how GenAI affords companies new possibilities to communicate, connect, and engage customers. They present and discuss six potential paradoxes of GenAI-enabled customer service, adding to the debate about the role and impact of GenAI for brands. They also offer brand response strategies to mitigate the downside and manage the potential upside of GenAI.

In innovation and R&D management, chatbots can assist in brainstorming and conceptualizing new ideas, analyzing existing research and data to generate novel concepts or suggest improvements to current designs, and processing and analyzing massive amounts of data to extract insights and develop innovative solutions. In this context, "Innovating by prompting: How to facilitate innovation in the age of generative AI" by Sundberg and Holmström (2024) provides examples to demonstrate four mechanisms of LLMs: translation, summarization, classification, and amplification. These mechanisms inform a framework with which the authors highlight how LLMs enable innovation through improved context awareness and content awareness.

In advertising, LLMs and their advanced understanding of customer data and preferences can help personalize marketing content, which might include providing product or content recommendations, improving ad targeting, and optimizing content monetization. In "To ChatGPT, or not to ChatGPT: Navigating the paradoxes of generative AI in the advertising industry," Osadchaya et al. (2024) discuss the paradoxical nature of ChatGPT in the advertising industry. After identifying three operational paradoxes that are associated with conducting research, creativity, and efficiency and one psychological paradox related to work

identity, the authors introduce a coping strategy to navigate these paradoxes.

Chatbots have many marketing applications. They can be used to generate personalized marketing content such as product descriptions and social media posts. In Cui et al.'s (2024) contribution, "How to build a competitive advantage for your brand using generative AI," the authors focus on the use of LLMs in the construction of brand personas and suggest that by embedding alternative perceptual systems into GenAI platforms, firms can achieve novel, interactive, and personalized insights that may be difficult for their competitors to replicate.

In "Managerial framework for evaluating AI chatbot integration: Bridging organizational readiness and technological challenges," Urbani et al. (2024) examine several chatbot challenges, including interoperability, data protection, and bias concerns. The authors present a novel framework for managers to assess a firm's readiness to adopt AI chatbot technology into customer service, sales, and marketing business functions.

### 3.4. Current and future industry applications

The third section of this special issue is comprised of articles that share insights into how LLM implementations can change various industries and contexts and discuss what the future might hold.

In "Generative AI in higher education and beyond," Hashmi and Bal (2024) talk about how the adoption of text and image-based chatbots has been splintered in higher education. They review the relationship between transparency and responsibility in the usage of GenAI, relate this work to the context of training and application of skills within higher education, and propose a framework for how higher education can engage with GenAI so that students are better prepared for its usage outside of school.

In Ramaul et al.'s (2024) "Creational and conversational AI affordances: How the new breed of chatbots is revolutionizing knowledge industries," the authors argue that AI capabilities are increasingly helpful in creative and knowledge-intensive industries that have long been considered a territory of human expertise. They offer an empirically grounded affordance theory viewpoint with which they analyze two distinct yet interrelated dimensions of new AI affordances: creational and conversational. They identify three creational (i.e., content creation and enhancement, knowledge search and discovery, task automation) and three conversational (i.e., contextual sensitivity, interactive accessibility, human—AI workflow synergy) affordances. The authors discuss how both types of these affordances also involve *disaffordances*—constraints that limit the usefulness of a new breed of chatbots—and introduce an integrated framework that shows how generative and conversational affordances reinforce each other via accessibility, accumulation, and adaptability.

Rajaram and Tinguely (2024) focus on powerful chatbot capabilities specifically in the context of small and medium enterprises (SMEs) in their article, "Generative artificial intelligence in small and medium enterprises: Navigating its promises and challenges." They discuss how SMEs can navigate both the promises and challenges of GenAI and offers a roadmap for deploying GenAI. The authors offer practical recommendations that serve as a useful navigation compass for successfully deploying GenAI in SMEs.

Finally, in "Navigating software development in the ChatGPT and GitHub Copilot era," France (2024) focuses on the ability of GenAI and LLMs—such as ChatGPT and GitHub Copilot—to create code has the potential to fundamentally change the software development landscape. The article gives an overview of the software development industry and the job functions of software developers. Then, France ties together the academic and developer insights and offers recommendations for software development managers and developers and introduces a CMM (capability maturity model) framework for assessing and improving LLM development usage.

## 4. A call to action: Ten important LLM topics for future research

We thank all the authors and reviewers who helped generate and improve the articles in this special issue. Each article focuses on the exciting and important challenges and opportunities of LLMs today, and many also point toward interesting topics that will emerge tomorrow. For example, reinforcement learning from human feedback (RLHF), with its goal to make language models more aligned with human values, is among the most promising areas of research (Ramponi, 2023). Another development on the horizon is deeply rooted in sophisticated multimodal reasoning capabilities that process inputs and outputs in audio, visual, and text formats at once.

### 4.1. Future research areas as outlined by Accenture (2023) and others

At the end of this special issue, we, with the help of ChatGPT and other sources, want to leave readers with a call to action to research these and other emerging phenomena.

#### 4.1.1. Technical applications of LLMs
LLMs have a wide range of applications in various fields such as natural language processing, bioinformatics, and materials science. Technical researchers can explore the potential of LLMs in their respective fields and identify new applications for their use (e.g., in cloud or API contexts).

#### 4.1.2. Model improvements
Researchers can work on improving the performance of LLMs by developing new models, fine-tuning existing models, and exploring new training techniques that will span software engineering, psychology, linguistic and other sciences.

#### 4.1.3. Foundational models
As more pretrained models emerge, research will be able to shed light on design choices related to balancing size, transparency, versatility, and performance, among other areas.

#### 4.1.4. Data
As GenAI features will be embedded within everyday platforms, enhancing adoption at scale will require researchers to focus on integration, adoption, security, and other data implementation issues.

#### 4.1.5. Infrastructure changes
How we prepare and manage the transition from our current infrastructure to one that is essential for deploying GenAI in the cloud will require researchers to concentrate on data center retrofitting. Applicable research will including technical topics such as new chipset architectures, hardware innovations, and efficient algorithms as well as implementation and change issues.

### 4.2. Future research areas related to social/organizational issues

#### 4.2.1. Organizational applications of LLMs
Researchers and practitioners alike will play a critical role in preparing organizations for their transition to widespread LLM adoption. As we prepare for a new wave of business process re-engineering, we need to reimagine what the "work of tomorrow" will look like, what tasks will be automated and what tasks will be informated (to borrow from Zuboff) with personal AI assistants, chatbots, etc., and how potentially disruptive change will be managed.

#### 4.2.2. Collaboration and reproducibility
Researchers may consider developing open-source methods and frameworks to facilitate collaboration and reproducibility in LLM research, but also to bring important stakeholders together to discuss the future of LLMs in our organizations and societies.

#### 4.2.3. Data collection and preprocessing
LLMs require large amounts of data to train effectively. Researchers could develop new methods for data collection and preprocessing to improve the quality of data used to train LLMs, and on the organizational side, to avoid risks of data leakage when employees might leak sensitive information in their prompts, etc.

#### 4.2.4. Interpretability and explainability
LLMs are often considered black boxes due to their complexity. Future research may include developing methods to interpret and explain the pros and cons of decisions made by LLMs to employees and other decision makers.

#### 4.2.5. Ethical considerations
As LLMs become more prevalent in scientific research, it is important to consider the ethical implications of their use. Researchers could consider the potential biases and limitations of LLMs and how they can be addressed (Watkins, 2023).

## 5. Wrap-up

As LLMs and chatbots will continue to improve with increasingly disruptive capabilities, managers will have to make important adoption and governance decisions for their organizations. Chatbot features, possibly beyond our wildest imagination today, will introduce new opportunities and threats for individuals, communities, firms, lawmakers, tech firms etc. In this context, we hope that our special issue, with all its articles and future research suggestions, will energize discussions and stimulate a new wave of research on LLMs and chatbots and their role in society and business.

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