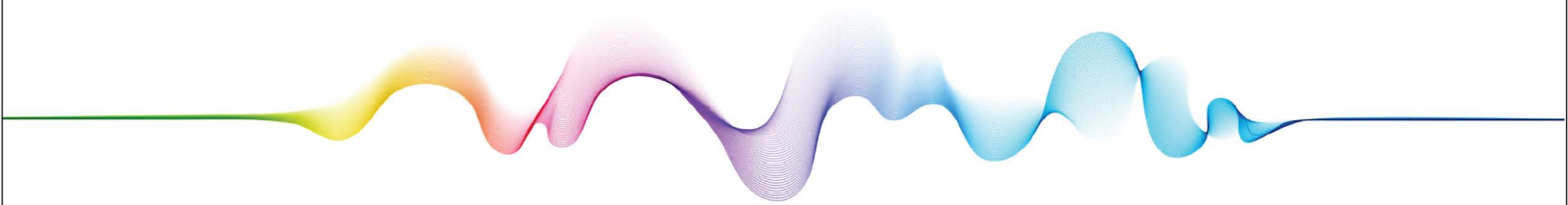# AN OVERVIEW OF CONVERSATIONAL ARTIFICIAL INTELLIGENCE (AI)

TAG

ARTIFICIAL INTELLIGENCE

An Overview of Conversational Artificial Intelligence (AI)

Prepared by
Dr. Edward Amoroso
Chief Executive Officer, TAG Infosphere, Inc.
Research Professor, NYU
eamoroso@tag-cyber.com

Version 1.0
March 17, 2024

This TAG Insights Report on *Conversational Artificial Intelligence (AI)* is intended to help companies, managers, practitioners, researchers, investors, and commercial vendors better understand current trends, issues, and market opportunities in this area. A list of representative commercial vendors working in various areas of Conversational AI is included. The five specific areas covered in this report include:

1. AI Chat Interfaces
2. AI Bots
3. Intelligent Text Analysis
4. Virtual Assistants
5. AI-Based Search

This report is intended for general and unrestricted use, but interested readers are encouraged to connect with the TAG research and advisory team for more information on the private TAG Research as a Service (RaaS) community that covers, discusses, and shares information on these topics in more depth and includes a wider range of startups, vendors, and companies.

TAG Taxonomy for AI

Our advisory work at TAG is guided by our TAG AI Taxonomy which includes twenty different market categories, with one hundred associated subcategories – all developed consistent with our research into emerging and existing commercial offerings. Subscribers to TAG Research as a Service (RaaS) have access to the more detailed specifics of the taxonomy and the full set of companies working in each area.

The taxonomy is intended to be interpreted as a market guide for commercial (and in some cases, open source) platform, tools, products, and services. The day-to-day tasks of any practitioners focused on AI will include many considerations such as dealing with regulators, addressing compliance issues, and keeping up with legislation that will not typically be represented in our taxonomy. We focus here on products and services.

TAG Artificial Intelligence (AI) Taxonomy V0.0

1 Agriculture and Farming	6 Conversational AI	11 Entertainment	16 Manufacturing
1.1 Precision Agriculture	6.1 AI Chat Interfaces	11.1 AI-Based Sports Analysis	16.1 AI-Based Predictive Maintenance
1.2 Intelligent Predictive Maintenance	6.2 AI Bots	11.2 AI Support for On-Line Dating	16.2 Advanced 3D Printing
1.3 Advanced Yield Management	6.3 Intelligent Text Analysis	11.3 AI-Generated Multimedia Content	16.3 Smart Robotic Assembly
1.4 AI-Based Disease and Pest Control	6.4 Virtual Assistants	11.4 AI-Based On-Line Gaming	16.4 AI-Based Factory Operations
1.5 Intelligent Livestock Monitoring	6.5 AI-Based Search	11.5 AI Support for Gambling	16.5 AI-Assisted Product Design
2 Autonomous Vehicles	**7 Core Technology**	**12 Finance**	**17 Marketing and Sales**
2.1 Intelligent Fleet Management	7.1 AI and Machine Learning Algorithms	12.1 Intelligent Fintech	17.1 AI-Assisted Advertising
2.2 Smart Manufacturing and Design	7.2 Natural Language Processing	12.2 Ai-Based Insurance Business	17.2 Intelligent Support for Sales
2.3 AI-Assisted Mobility Services	7.3 AI Software Platforms and Tools	12.3 Smart Investment Support	17.3 AI-Based Marketing
2.4 AI-Based Delivery Services	7.4 Intelligent Computing Devices	12.4 AI-Assisted Loan Reviews	17.4 Smart Social Media Marketing
2.5 Next Generation Ride Sharing	7.5 Smart AR/VR Devices	12.5 AI-Based Credit Process	17.5 Advanced Predictive Modeling
3 Biotechnology	**8 Customer Service**	**13 Human Resources**	**18 Military and Security**
3.1 AI-Assisted Drug Discovery	8.1 Smart Help Desk	13.1 Intelligent Career Support	18.1 Advanced Surveillance
3.2 Personalized Medicine	8.2 AI-Based Product Support	13.2 AI-Based Personal Coaching	18.2 AI for Cybersecurity
3.3 Intelligent Medical Diagnostics	8.3 AI-Assisted Customer Success	13.3 AI-Based Performance Reviews	18.3 AI-Based Law Enforcement
3.4 AI-Based Health Analytics	8.4 Personalized Customer Support	13.4 Smart Recruiting and Workforce	18.4 AI Support for Warfighter
3.5 Intelligent Clinical Trial Support	8.5 Smart Customer Crowd Management	13.5 AI-Based Compensation Management	18.5 AI-Based Weapons and Deep Fakes
4 Business Operations	**9 Data Analysis**	**14 Information Technology**	**19 Software Process**
4.1 Smart Supply Chain Optimization	9.1 AI-Based Predictive Modeling	14.1 AI-Based IT Support	19.1 AI-Based Coding Support
4.2 Intelligent Inventory Optimization	9.2 AI-Based Business Intelligence	14.2 AI-Based IT Design	19.2 Smart Software Lifecycle Support
4.3 AI-Based Demand Forecasting	9.3 AI-Based Data Normalization	14.3 Advanced AI-Based Search	19.3 AI-Based Software Quality
4.4 Intelligent Quality Control	9.4 Intelligent Big Data Analytics	14.4 AI-Powered Apps	19.4 AI-Based Test Case Generation
4.5 Smart Contracts	9.5 Smart Simulated Data Generation	14.5 AI-Generated Websites	19.5 Intelligent Software Test and Analysis
5 Commerce	**10 Education**	**15 Machines**	**20 Transportation**
5.1 AI Support for Retail	10.1 AI-Based Remote Learning	15.1 Next Generation Robots	20.1 AI-Based Transportation Logistics
5.2 AI Support for Warehousing	10.2 Ai-Based Remote Teaching	15.2 Computer Vision	20.2 Personalized Transportation
5.3 Intelligent Product Exchanges	10.3 Smart Tailored Education	15.3 Computer Speech	20.3 Smart Mapping Tools
5.4 Smart Auctions	10.4 Smart Learning Management	15.4 Autonomous Internet of Things	20.4 AI-Based Flight Operations
5.5 AI-Based Professional Services	10.5 AI-Based Standardized Testing	15.5 Agricultural Robots	20.5 AI-Based Rail Operations

Figure 1. TAG AI Taxonomy

Overview of Conversational Artificial Intelligence (AI) Works
The following emerging global commercial opportunities involving Conversational AI are covered in this report, including the listing of several viable commercial entities providing solutions on the market today:

- AI chat interfaces, by offering seamless and personalized interactions, are reshaping customer engagement strategies, driving the market for conversational AI towards more intuitive and responsive solutions, enhancing user experiences across various platforms.
- AI bots, with their ability to automate tasks and provide real-time assistance, are fueling the demand for conversational AI, empowering businesses to streamline operations, improve customer support, and boost efficiency in diverse sectors.
- Intelligent text analysis, through its capacity to extract insights from vast amounts of unstructured data, is catalyzing advancements in conversational AI by enabling more sophisticated natural language understanding and generating actionable intelligence for enhanced decision-making.

- Virtual assistants, with their multifunctional capabilities and integration across devices, are propelling the conversational AI market forward by revolutionizing how users interact with technology, offering personalized assistance, and facilitating seamless task completion in both personal and professional spheres.
- AI-based search, leveraging advanced algorithms and machine learning techniques, is driving innovation in conversational AI by delivering more relevant and contextual search results, enhancing user satisfaction, and optimizing information retrieval experiences across digital platforms and services.

Focus Area: AI Chat Interfaces

AI chat interfaces serve as the primary means of communication between users and computer systems, enabling seamless interactions through text or speech inputs. These interfaces rely on advanced natural language processing (NLP) algorithms to understand user queries and generate appropriate responses.

Techniques such as recurrent neural networks (RNNs) and transformer models like BERT are commonly employed to enhance language understanding and response generation. The significance of AI chat interfaces in driving the advancement of conversational AI cannot be overstated. They facilitate personalized interactions and automate tasks through conversational agents, thereby enhancing user experiences across various platforms.

AI chat interfaces find widespread applications in customer service platforms, virtual assistants, and chatbots deployed across diverse industries. Businesses leverage these interfaces to provide round-the-clock support to customers, automate routine inquiries, and streamline communication processes. By harnessing the power of AI, chat interfaces enable organizations to scale their customer service operations efficiently while maintaining high levels of user satisfaction. Furthermore, ongoing research in this domain focuses on refining contextual understanding, improving multi-turn dialogue management, and incorporating emotion recognition to make interactions more human-like.

As technology continues to evolve, the role of AI chat interfaces will become even more pronounced. With advancements in natural language understanding and machine learning, these interfaces will be capable of handling increasingly complex queries and engaging in more meaningful conversations with users. Moreover, as voice-enabled interfaces gain popularity, AI chat interfaces will play a crucial role in enabling hands-free interactions and providing accessibility to individuals with disabilities.

Focus Area: AI Bots

AI bots, also known as chatbots or conversational agents, are software programs designed to emulate human-like conversations and automate tasks. These bots leverage various machine learning techniques, including supervised learning and reinforcement learning, to interpret user intents and provide relevant responses. Natural language understanding (NLU) and dialog

management are essential components of AI bots, enabling them to engage in coherent conversations effectively.

The significance of AI bots in driving the advancement of conversational AI cannot be understated. Across industries, businesses are increasingly deploying AI bots to streamline customer support, automate routine tasks, and enhance operational efficiency. In e-commerce, for example, AI bots assist customers in finding products, placing orders, and resolving inquiries, thereby improving the overall shopping experience. Similarly, in healthcare, AI bots are used to provide preliminary medical advice, schedule appointments, and answer frequently asked questions, thereby relieving pressure on healthcare professionals and improving patient outcomes.

The versatility of AI bots makes them suitable for a wide range of applications, from customer service to personal productivity. With advancements in machine learning and natural language processing, AI bots are becoming increasingly capable of handling complex queries and engaging in more sophisticated conversations with users. Moreover, as organizations continue to invest in AI research and development, AI bots will likely become more intelligent and adaptable, further driving the advancement of conversational AI.

Focus Area: Intelligent Text Analysis

Intelligent text analysis is a crucial component of conversational AI, enabling systems to extract meaningful insights from unstructured textual data. This includes tasks such as sentiment analysis, named entity recognition, and topic modeling. Machine learning models, such as deep learning architectures and pre-trained language models, are commonly used in intelligent text analysis to achieve high accuracy in understanding and processing text.

The importance of intelligent text analysis in driving conversational AI cannot be overstated. In chatbots and virtual assistants, for example, intelligent text analysis enables systems to understand user queries, extract relevant information, and generate contextually appropriate responses. By analyzing text data from various sources, including social media, emails, and customer reviews, intelligent text analysis helps organizations gain valuable insights into customer preferences, sentiments, and trends.

As the volume and complexity of textual data continue to grow, the demand for intelligent text analysis solutions will only increase. Organizations across industries are increasingly leveraging intelligent text analysis to automate repetitive tasks, extract actionable insights, and improve decision-making processes. Moreover, with advancements in machine learning and natural language processing, intelligent text analysis systems will become more sophisticated and capable, further driving the advancement of conversational AI.

Focus Area: Virtual Assistants

Virtual assistants are AI-driven applications designed to assist users with various tasks through natural language interactions. These assistants leverage a combination of speech recognition,

natural language understanding, and dialog management techniques to interpret user requests and provide relevant responses. By offering personalized assistance, performing tasks on behalf of users, and integrating with other systems, virtual assistants drive the evolution of conversational AI.

Virtual assistants find applications in a wide range of domains, including smart devices, mobile applications, and customer service platforms. They help users with tasks such as scheduling appointments, setting reminders, retrieving information, and completing online transactions. The ability of virtual assistants to understand and respond to natural language queries makes them valuable tools for enhancing user productivity and convenience.

The importance of virtual assistants in driving conversational AI cannot be understated. As organizations increasingly adopt AI-driven solutions to improve customer experiences and streamline operations, the demand for virtual assistants will continue to grow. Moreover, as advancements in machine learning and natural language processing continue to progress, virtual assistants will become more intelligent and adaptable, further enhancing their capabilities, and driving the advancement of conversational AI.

Focus Area: AI-Based Search

AI-based search leverages machine learning algorithms to enhance traditional search engines, providing users with more relevant and personalized results. These algorithms analyze user queries, behavior, and contextual information to improve search accuracy and user satisfaction. By enabling natural language understanding, semantic search, and personalized recommendations, AI-based search drives the advancement of conversational AI.

AI-based search finds applications in a wide range of domains, including chatbots, virtual assistants, and e-commerce platforms. It helps users find information, products, and services efficiently, thereby improving the overall user experience. The ability of AI-based search to understand user intent and provide relevant results makes it a valuable tool for enhancing user productivity and satisfaction.

The importance of AI-based search in driving conversational AI cannot be overstated. As organizations increasingly adopt AI-driven solutions to improve customer experiences and streamline operations, the demand for AI-based search will continue to grow. Moreover, as advancements in machine learning and natural language processing continue to progress, AI-based search will become more intelligent and adaptable, further enhancing its capabilities, and driving the advancement of conversational AI.

Companies and Contributions

The companies listed below emerged as part of our research at TAG. Our goal in listing these fine firms is to provide a starting point for buyers, advocates, stakeholders, and researchers trying to make sense of the commercial landscape for conversational artificial intelligence solutions.

AI Chat Interfaces Vendors

1. ActiveChat: ActiveChat offers a chatbot builder platform with natural language understanding capabilities for creating AI chat interfaces.
2. Ada Support: Ada Support offers an AI-powered chatbot platform for customer support, helping businesses automate responses and improve customer service.
3. ChatGPT by OpenAI: OpenAI's ChatGPT is an advanced AI language model used to build conversational AI interfaces for various applications, from customer support to content generation.
4. Drift: Drift focuses on conversational marketing and sales, offering a chatbot platform to engage and qualify leads through real-time conversations.
5. Freshworks: Freshchat, a product of Freshworks, offers a messaging platform with AI chatbots for customer engagement and support.
6. Gupshup: Gupshup provides conversational AI and messaging solutions to businesses, enabling them to build chatbots and interactive messaging experiences.
7. Intercom: Intercom offers a customer messaging platform with AI chatbots for sales, marketing, and support.
8. Kuki: Kuki Chatbot provides an AI chatbot platform for e-commerce businesses to enhance customer service and increase sales.
9. Landbot: Landbot enables businesses to create conversational AI chat interfaces for lead generation and customer interactions.
10. LiveChat: LiveChat is a business live chat software for e-commerce and business-to-business (B2B) software as a service (SaaS) companies.
11. LiveAgent: LiveAgent is a customer support software with live chat functionality.
12. Pandorabots: Pandorabots specializes in chatbot development with its AI-driven bot-building platform and natural language understanding capabilities.
13. Re:amaze: Re:amaze is a customer service, live chat, and help desk platform for online businesses.
14. Tars: Tars specializes in chatbots for lead generation, offering a platform to create conversational landing pages and sales funnels.
15. Tawk.to: The tawk.to platform is a free live chat software for websites.
16. Tidio: Tidio is an AI customer service software with live chat features.
17. Whisbi: Whisbi offers conversational sales and marketing solutions with AI-powered chat interfaces for real-time engagement.
18. Zendesk: Zendesk Chat provides live chat software with AI-powered chatbots to enhance customer support and engagement.

AI Bots Vendors

1. Acquire: A customer engagement platform that includes chatbots and AI-driven communication tools.
2. Amazon: Amazon offers a product called Lex which is a service for building conversational interfaces using voice and text for applications.
3. Chatfuel: Offers a bot-building platform for creating Facebook Messenger chatbots.

4. Cognigy: Offers an AI-driven conversational platform for building chatbots and virtual assistants.
5. Conversica: Specializes in AI-driven sales and marketing automation with the use of conversational AI.
6. Google: Offers a product called Dialogflow that provides natural language processing for building chatbots and virtual assistants.
7. IBM: Offers Watson that provides AI-powered chatbots and virtual agents for customer service and other applications.
8. Inbenta: Provides natural language processing for chatbots and self-service support.
9. Microsoft: Offers a product called Microsoft Bot Framework which enables developers to create chatbots for various messaging platforms.
10. Pypestream: Provides AI chatbots and messaging solutions for customer service and engagement.
11. Rasa: Open-source conversational AI platform for building chatbots and virtual assistants.
12. Twilio: Offers a product called Voice which allows developers to build and deploy conversational bots across multiple channels.

Intelligent Text Analysis Vendors

1. Altair: A data science platform that includes text analytics and natural language processing capabilities.
2. Brandwatch: Offers social media analytics and text analysis for market research.
3. Datumbox: Provides machine learning-based text analysis tools for various natural language processing tasks.
4. DiscoverText: Offers text analysis and data retrieval tools for researchers and analysts.
5. Expert.ai: Provides natural language understanding and text analytics tools for businesses.
6. Gavagai: Provides text analysis and sentiment analysis tools for understanding customer feedback.
7. Kapiche: Specializes in customer feedback analysis and text sentiment analysis.
8. Keatext: Offers text analytics and customer feedback analysis for businesses.
9. Lexalytics: Provides natural language processing and text analytics solutions for businesses.
10. MeaningCloud: Offers text analysis APIs for sentiment analysis, entity recognition, and text classification.
11. Meltwater: Offers media monitoring and social listening services with text analysis capabilities.
12. MonkeyLearn: Offers text analysis tools, including sentiment analysis, text classification, and entity recognition.
13. OpenText: Offers a range of enterprise solutions, including text analytics and information extraction.
14. Provalis Research: Specializes in text analysis software for content analysis and text mining.

15. Quantexa: Provides text analysis and natural language processing solutions for businesses.
16. Rosoka: Provides multilingual text analytics solutions for entity extraction and relationship analysis.
17. Scraawl: Scraawl is a suite of data analytics tools designed to empower you to gain more from your data. Scraawl has powerful tools to enhance your analyses. Scraawl leverages state-of-the-art artificial intelligence and machine learning techniques to provide actionable insights through analytics.
18. Textable: Provides AI-based text analysis for survey data and customer feedback.
19. TextRazor: Offers a text analysis API for entity recognition, sentiment analysis, and more.

Virtual Assistants Vendors

1. Alibaba AliGenie: Alibaba's virtual assistant, often used in conjunction with their smart home products.
2. Amazon Alexa: Amazon's virtual assistant, used in their Echo devices and available for third-party developers.
3. Apple Siri: Apple's virtual assistant integrated into iOS devices.
4. Google Assistant: Google's virtual assistant used in a wide range of devices and applications.
5. Microsoft Cortana: A virtual assistant by Microsoft, primarily used in their Windows ecosystem.
6. Nuance Communications: Provides speech recognition and virtual assistant technology.
7. Rulai: Offers a platform for creating AI-powered virtual assistants and chatbots.
8. Samsung Bixby: Samsung's virtual assistant, designed for their mobile devices and appliances.
9. Xiao AI: Xiaomi's virtual assistant is used in their products.

AI-Based Search Vendors

1. Algolia: Algolia is a search and discovery API for websites and mobile apps that utilizes AI to improve search functionality.
2. Cludo: Cludo provides AI-enhanced search solutions for improving website search experiences.
3. Tecnotree: Tecnotree specializes in AI-driven search and insights for businesses.
4. Coveo: Coveo is an AI-powered search and relevance platform for businesses, improving customer experiences.
5. Elastic: Elasticsearch is an open-source search and analytics engine often used in enterprise applications and powered by AI technologies.
6. Eva.ai: Eva.ai focuses on AI-powered search and analytics solutions for workforce management.
7. Google: Google's search engine uses AI algorithms to provide highly relevant search results and offers features like Google Assistant.
8. Houndify: Houndify, by SoundHound, offers voice AI and search technology for various applications.

9. [Lucidworks](#): Lucidworks provides AI-powered search and discovery solutions for enterprises.
10. [Microsoft Bing](#): Microsoft's search engine employs AI to deliver search results and offers various intelligent features.
11. [Sinequa](#): Sinequa offers AI-powered enterprise search and analytics solutions to extract insights from data.
12. [Yext](#): Yext provides AI-based search experiences that help businesses manage their digital knowledge.

About TAG

TAG is a trusted research and advisory company that utilizes an AI-powered SaaS platform to deliver on-demand insights and recommendations in cybersecurity, artificial intelligence, and climate science to thousands of commercial solution providers and Fortune 500 enterprises. Founded in 2016 and headquartered in New York City, TAG bucks the trend of pay-for-play research by offering unbiased and in-depth guidance, market analysis, project consulting, and personalized content—all from a practitioner perspective.