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SPECIAL REPORT

Generative Artificial Intelligence (AI): Who (or What) Wrote This?

Contents

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Generative Artificial Intelligence (AI): Who (or What) Wrote This?

Artificial intelligence (AI) has long held the potential to revolutionize the future. That potential is becoming increasingly tangible through the recent advances in generative AI, which is capturing the attention of people around the world. So, what is generative AI, and how is it different from other types of AI?

Here is how ChatGPT, a generative AI tool released in November 2022, answered the question "What is AI versus generative AI?":

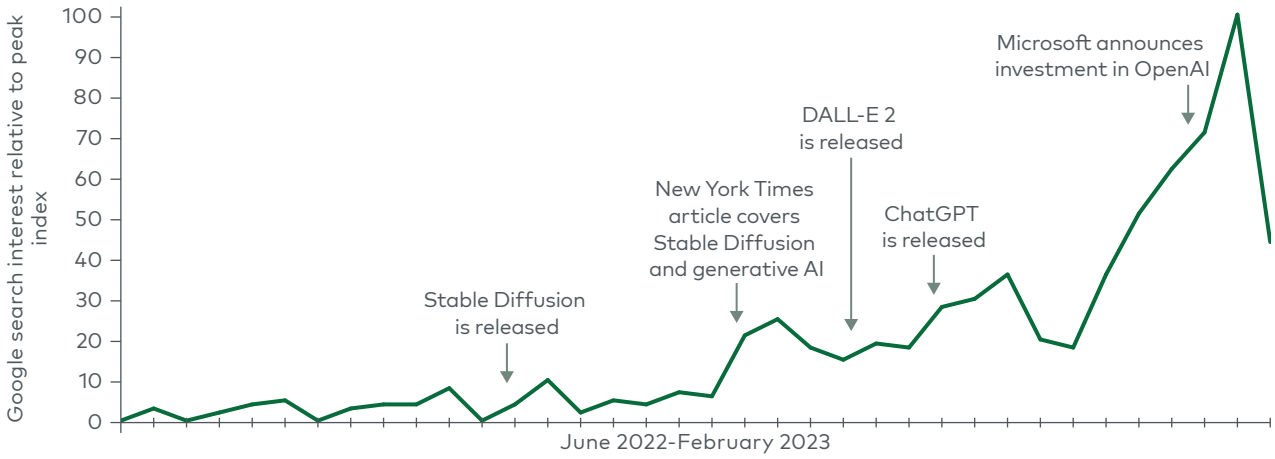
"AI refers to a broad category of techniques for building intelligent systems, while generative AI refers to a specific type of AI that focuses on generating new data. ... The goal of generative AI is to enable machines to autonomously create content in a way that resembles human-generated content ..."
– ChatGPT, OpenAI

In other (human-derived) words, generative AI uses machine learning (ML) algorithms to learn patterns from training data sets, which can include existing text, images and other content, and then applies those learned patterns to create new original outputs. Generative AI can produce novel content in the form of text, images, video and audio, and in some circumstances, it can even write code.

How did generative AI become the latest AI buzzword? Google Trends shows a significant increased interest in generative AI near the end of 2022,[1] coinciding with the release of ChatGPT, an AI chatbot that can seemingly answer any query from "How do I care for a burn?" to "Can you write a lasagna recipe to the tune of a 'Hamilton' song?" (see Figure 1). Outside of ChatGPT, several factors have driven both public and commercial interest in generative AI.

First, remarkable advancements in deep learning and access to computing power and data have made it possible to train complex generative models. Second, the low-cost (or in some cases free) model of generative AI tools has resulted in a newfound accessibility that allows everyday consumers to use the powerful technology. Lastly, generative AI is increasingly demonstrating it has real-world potential in a variety of applications, which will be outlined below. End users, corporations and investors alike are excited about the possibilities.

Figure 1
Google search trends for generative AI



Note: Y-axis represents search interest relative to the highest point on the chart for the given region and time; a value of 100 is the peak popularity for the term, a value of 50 means that the term is half as popular and a score of 0 means there was not enough data for this term; interest was negligible in 2021 despite earlier generative AI product releases
Source: Google Trends; L.E.K. analysis

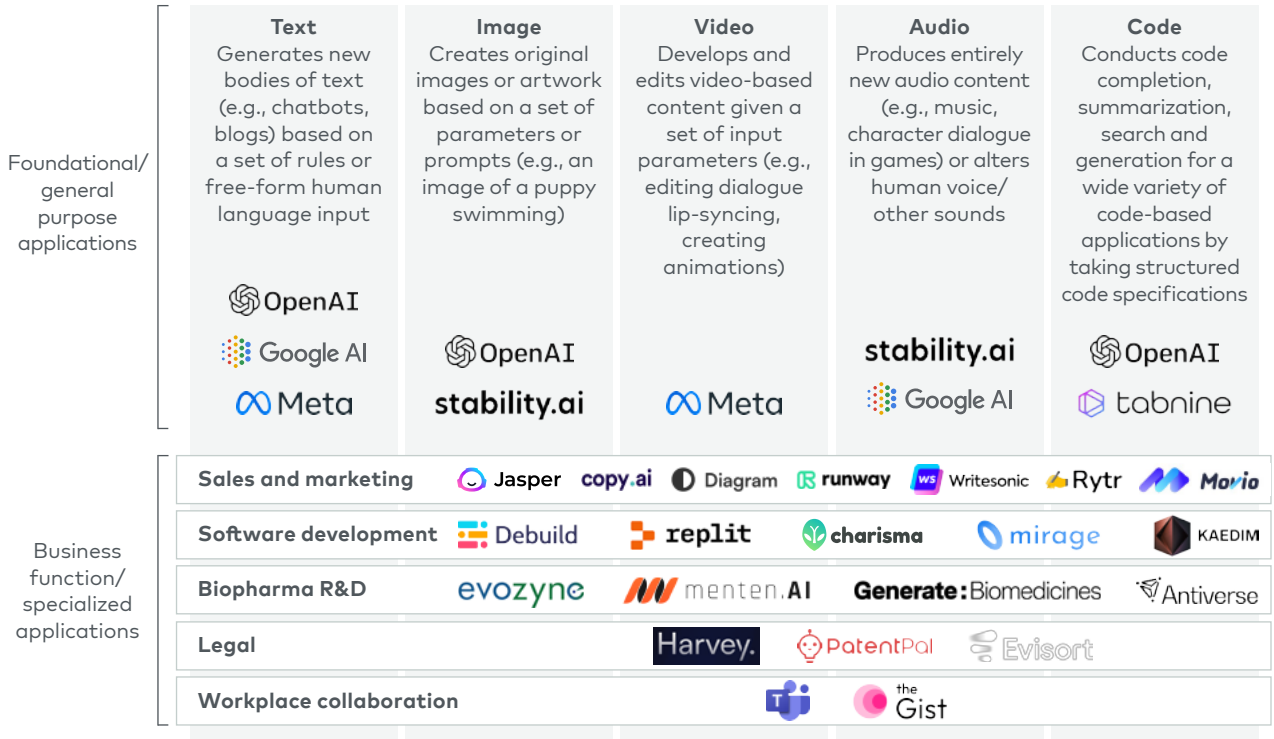
This excitement is translating to material demand. Within the market of image-generating tools, DALL-E (created by OpenAI, the same firm that launched ChatGPT) creates 2 million original images daily.[2] Stable Diffusion, a competing tool, has more than 10 million daily users, and its open-source version has been downloaded over 200,000 times.[3] Lightricks, an AI image and video editor, has over 5 million monthly subscribers across its four core products.[4] Within the ecosystem of text-generative tools, ChatGPT has 13 million unique daily users.[5] Copy.ai, another text-based program, claims it has assisted more than 7 million users in creating drafts for blog posts and marketing copy.[6] Demand is expected to grow as the technology evolves to solve new use cases.

Investors have taken note, with venture capitalists (VCs) investing $2.1 billion in generative AI companies in 2022 alone.[7] Beyond VCs, strategic corporate investors are paying attention and following suit. Microsoft has invested a total of $11 billion since 2019 in industry leader OpenAI alone.[8] The two companies became partners in 2019, with OpenAI exclusively using Microsoft Azure for cloud computing and Microsoft planning to deploy OpenAI throughout its platforms (e.g., Azure, Bing, Teams) as a part of its cloud platform strategy. Jasper.ai, a generative blog post creator, has raised $125 million and is currently valued at $1.5 billion.[9] As the industry, technologies and investments continue to grow, the different forms and functions that generative AI fills will also expand.

Generative AI market overview

While many existing generative AI tools are general purpose, some companies have started tailoring generative AI to solve problems within different business functions. The market can be classified based on output modalities (e.g., text, image) and business function applications (e.g., marketing, legal). See Figure 2 for an illustration of the classifications and representative companies in that space. Although the market could also be categorized based on the technical stack illustrating the underlying apps, models and infrastructure required to run generative AI, we choose to frame the market as an intersection of modalities (e.g., text, image) and business functions (e.g., sales) to help identify opportunities for generative AI in everyday business applications.

Figure 2
Model map of generative AI applications with select representative companies



Source: Sequoia Capital; Leonis Capital; L.E.K. research and analysis

Output modalities generally fall within five categories and can cover a wide range of applications and use cases:

- **Text**-based tools can create the foundation for a sales pitch, summarize the primary takeaways in a meeting or produce the first draft of a legal document
- **Image**-based tools, outside of generating art, can create product images in specified settings
- **Video**-based tools can assist with creating virtual human actors or scenes for videos
- **Audio**-based tools can assist with music composition, develop new music in a specified genre or mood, or create voice-overs for video content
- **Code**-based tools can develop code using guided specifications or help complete the remaining code for an unfinished program

Existing generative AI solutions are concentrated in a subset of business functions such as sales and marketing, workplace collaboration (e.g., automated note taking and meeting summaries) and legal. The language-oriented nature of these business functions, and the relative maturity of natural language processing (NLP) and text-based generative AI (relative to image-, video-, audio- or code-based), has made them early test cases for generative AI solutions. Many of the business function-oriented solutions are aimed at improving productivity, whether that be more efficiently creating marketing content or responding faster to a customer query. While there are only a few commercial solutions currently available for functions such as finance, supply chain and HR, it is expected that new solutions will emerge.

Generative AI business applications

Companies can get started today with using generative AI and experiment with lower-risk, lower-impact use cases to better understand the technology and its potential benefits. In most cases, barriers to entry are low, with several commercial solutions available for companies to demo and pilot. Many of these lower-risk, lower-impact applications are tangible ways to improve workplace productivity in areas such as sales and marketing.

The following three applications for this category of generative AI are commonly utilized across various industries today and could be leveraged further in medtech and healthcare companies.

Industry-agnostic, productivity-focused applications:

1. Reduce administrative tasks
2. Increase sales team efficiency
3. Boost search engine optimization (SEO) rankings with generated internet content

Over the long term, generative AI may address more advanced and specialized solutions but will require higher levels of investment to develop. For medtech and healthcare companies, creating solutions that benefit patients, in addition to streamlining internal operations, inherently carries higher risk but brings greater benefits.

The following three emerging applications depict ways that medtech and other health organizations could leverage generative AI to improve healthcare, targeted toward both patients and internal operations.

Healthcare- and medtech-specific applications:

4. Provide interactive education for at-home medical device use
5. Optimize the patient journey
6. Facilitate communication between clinicians and health insurance companies to reduce administrative burden

Industry-agnostic, productivity-focused applications

Application 1 – Reduce administrative tasks

Microsoft introduced new features that incorporate OpenAI's GPT-3.5 to improve virtual meetings.[10] With this enhancement, Microsoft Teams Premium can now make intelligent summaries of multiparty meetings, assign AI-generated tasks and do live translations. Harvard Business Review finds that the average employee spends approximately 40% of their time at work on low-value tasks such as scheduling meetings or taking notes.[11] Medtech companies can easily adopt this solution to reduce these lower-skilled administrative tasks and create the time and space to prioritize higher-value analysis and decisions.

Application 2 – Increase sales team efficiency

Sales is another business function that is benefiting from the adoption of generative AI, with several competing tools in the market. Microsoft Viva Sales, a customer relationship management support application, uses generative AI to write email content, develop proposals, respond to inquiries and address customer concerns. Jasper.ai similarly has

dedicated functions for sales teams to generate outbound emails, respond to questions and simplify complex technical content provided by software development teams. Considering that businesses that respond within an hour to customers are seven times more likely to have meaningful conversations with decision-makers,[12] these tools can widely benefit sales teams. Medtech companies can experiment with these third-party tools to boost their sales efficiency and effectiveness.

Application 3 – Boost SEO rankings with generated internet content

SEO is crucial for consumer-facing companies. Because search engines use website content to help rank results, some companies have decided to use AI-generated articles to improve their SEO rankings. For example, Bankrate.com, a U.S.-based financial site, has published over 150 AI-generated articles that provide qualitative information to answer questions about financial concepts like "What is liquidity?" or "What is a business line of credit?"[13] Search engines treat these articles like human-generated content, which results in an improvement of Bankrate's overall SEO. Though a human employee still reviews and edits the articles, having AI-generated articles improves employee productivity drastically. Early application of generative AI to article writing may generate accidental errors (e.g., in one article, Bankrate miswrote that a 5/1 ARM is a 30-year mortgage[14]), but the concept of leveraging tools to enhance SEO results is clearly possible, though careful human oversight is required to ensure article accuracy.

Consumer-oriented medical device companies (e.g., hearing aid companies, durable medical equipment suppliers) can use generative AI to help boost internet presence, SEO rankings, and awareness among patients and customers. For example, when searching "How to select over-the-counter hearing aids," no hearing aid company (Jabra, Eargo, Sony, etc.) appears in the top results. AI-generated content could expand access to basic information, such as simple educational articles on how to select and fit hearing aids, which could change the way medtech companies think about bringing their products "below the line" — a trend that will be discussed in a forthcoming L.E.K. Consulting *Executive Insights* article.

Healthcare- and medtech-specific applications

While the previous applications are applicable to companies across industries, the following are areas of emerging opportunities for medtech and healthcare companies.

Application 4 – Provide interactive education for at-home medical device use

Since engaging with patients and providing quality support at scale is challenging for medical device companies, durable medical equipment suppliers and providers, medtech companies are beginning to explore how generative AI can help provide

basic explanations and guide patients through proper device use. An orthopedic physical therapy patient could ask: "How far should my knee bend today? I had my knee replaced seven days ago." A diabetes patient could ask: "My continuous glucose monitoring sensor is not sticking correctly; what should I do?" An ostomy bag user could ask: "What do I do if my ostomy bag leaks?" Experts cite that most applications used for self-monitoring devices rarely include personalized feedback, which makes daily care more difficult when patients have questions or concerns.[15] Utilizing generative AI-enabled solutions improved not only patient education, but also patient satisfaction and customer support effectiveness, though the liability risks for providing patient advice will need to be addressed. In some ways, generative AI will improve the experience that search engines like Google (with Bard) and Bing (with ChatGPT) have and bring drastic improvements for medical device users if medtech companies are able to evaluate when and how to leverage generative AI thoughtfully, while accounting for business-specific and product-specific risks.

Application 5 – Optimize the patient journey

In recent years, the healthcare system has been strained by COVID-19, coupled with labor shortages. Health systems are overwhelmed by high call volumes, with 82% of clinical support staff reporting frustration from coordinating care with patients over the phone.[16] In addition, while most industries typically resolve 74% of calls without any transfers, holds or callbacks, the healthcare industry resolves only 20% of calls with the same efficiency.[17] Generative AI could help reduce this strain by supplementing patient navigation with AI-enabled solutions, supporting in areas such as physician referral follow-ups, sharing information on how to prepare for an upcoming operation, and ensuring appropriate discharge planning and rehabilitation plans. Leveraging generative AI for patient navigation can resolve such inefficiencies, provide patients with a more satisfactory clinical experience and help reduce staff burnout. As medtechs look to transform their transactional relationship with providers into more of a true partnership, offering solutions to address patient navigation challenges could be a very welcome value add.

Application 6 – Facilitate communication between clinicians and health insurance companies to reduce administrative burden

Physicians overburdened with administrative tasks is a widespread healthcare industry problem, and the American College of Physicians estimates that physicians have to spend two hours completing administrative work for every hour spent interacting with a patient.[18] Filing insurance claims and communicating with payers is one example of an administrative task that may soon be streamlined through generative AI. With generative AI models being trained on data sets, niche use cases

can improve outputs by customizing generative AI training sets to include more information on industry-related language and dynamics. In terms of using generative AI for health insurance communication, customizing training sets would further improve specificity and precision of program outputs. This would allow generative AI to have the capacity to streamline paperwork creation to submit to insurance companies, outline a patient's medical history with reasoning to support coverage, and resolve insurance disputes. Clinicians are already experimenting with tools today. For example, one clinician asked ChatGPT to write a letter to an insurance company and include an explanation for why a patient needed treatment,[19] and the tool provided a template for the clinician to build on. A commercialized version of the solution can lessen clinicians' administrative burden, resolve insurance disputes and save time communicating with health insurance companies.

Risks with generative AI

As Voltaire wrote, and then Spiderman internalized, with great power comes great responsibility. Though generative AI technology shows a lot of potential to drive efficiencies and personalization for companies, there are meaningful risks associated with the technology. Failure to address these risks can harm companies, customers and stakeholders. For example, Bankrate has faced public backlash for its use of AI-generated articles and is temporarily pausing creation of new articles until the public spotlight dims.[20] Stability AI insufficiently addressed copyright risks when it used original artwork to train AI models without artists' consent, and this has led to a class action lawsuit.[21] Companies are still at the early stages of understanding how to mitigate risks to ensure successful deployment of the technology (see Figure 3).

Figure 3
General risks for companies to consider when using generative AI

Copyright and intellectual property challenges	Generative AI models can produce unauthorized versions of original works, leading to legal disputes and financial loss.
Data bias and accuracy risk	Data can be biased, incomplete and inaccurate. When generative AI models are trained on unknowingly faulty data sets, the models will have the same blind spots and biases.
Public backlash or headline risk	Negative press and public concerns over AI (e.g., loss of jobs from automation, algorithm-driven consumer manipulation) may bring unfavorable attention to companies using generative AI and hinder widespread adoption.
Return on investment	It may be difficult for companies to internally measure productivity increases from using generative AI tools and whether it is worth investing in the technology.

Source: L.E.K. research and analysis

While there are general risks associated with generative AI, applying such technologies to healthcare introduces a different set of challenges. From HIPAA regulations limiting what can be done with patient data to Food and Drug Administration (FDA) oversight over the safety of AI-enabled medical devices and software, generative AI will face a unique set of challenges in the healthcare industry but remains an area with high potential rewards for the firms that can figure out where and how to use generative AI. Figure 4 depicts a nonexhaustive list of risks medtech companies will need to consider when using generative AI for healthcare purposes. Given the high-risk, high-reward nature of generative AI in healthcare, it is key to have the right team of internal and external stakeholders when strategically evaluating how medtech companies may begin using generative AI.

Figure 4
Healthcare-specific risks for medtech companies to consider when using generative AI

Clinical risk	Model outputs may be difficult for medical professionals and patients to interpret as generative AI often functions as a "black box" and may lead to incorrect medical decisions and diagnoses.
Healthcare-specific data risk	General data inaccuracies pose unique risks in healthcare. Insufficient, biased, incomplete and inaccurate data can lead to underdiagnoses or misdiagnoses for ethnic or racial minorities, LGBTQ+ individuals and other underrepresented people.
Liability	Inaccurate medical information provided by AI can pose a danger to patient safety and can create liability issues for parties responsible for the medical advice that AI may generate.
Patient behavioral risk	Healthcare consumers may come to overly rely on self-diagnoses instead of getting advice from healthcare professionals.
Privacy risk	Medtech firms are at risk of improper access to sensitive data and loss of confidential information, which can increase the risk of violating privacy laws (e.g., HIPAA, general data protection regulation (GDPR)).
Regulatory risk	Cross-industry applications: Future regulatory landscape for generative AI use is unclear. While regulations for generative AI may occur at the state level if lawmakers believe it to be a threat concerning privacy or discrimination (e.g., Illinois AI Video Interview Act[22]), generative AI regulation is a concern but not a focus of the U.S. federal government. Nonclinical healthcare/medtech applications: Historically, the FDA and other regulatory bodies have not regulated nonclinical AI/ML and AI/ML proliferates in patient engagement, billing, etc. Generative AI is likely to be treated similarly in this case. Clinical healthcare/medtech applications: The FDA monitors the safety and regulates the approval of AI-enabled medical devices and software. Generative AI will likely fall under the guidance issued in its action plans "Artificial Intelligence and Machine Learning in Software as a Medical Device"[23] and "Software as a Medical Device."[24]
Reimbursement	Public and private health payers may not be willing to reimburse for the use of generative AI-enabled medical devices or healthcare solutions.

Note: ML=machine learning
Source: L.E.K. research and analysis

Longer-term implications for medtechs

While generative AI is not widely used by medtech companies today, clear use cases are emerging, and companies are beginning to experiment with how it can drive new ways of operation and engagement. In the short term, with relatively low risk, medtech companies can adopt third-party applications to automate and streamline internal business processes (meeting efficiency, customer sales engagement, etc.). As generative AI matures and risks are mitigated, use cases will likely expand beyond basic business functions into more advanced and possibly even external-facing applications that are more clinically focused. For healthcare organizations this could mean developing and deploying generative AI in more complex use cases, including those facilitating research and development, engaging more directly with patients, supporting provider-patient interactions and more. Furthermore, innovative medtechs may be able to use generative AI to create synthetic images for education/training, synthetic images and data for clinical development, and image enhancement for diagnosis and procedures, or to assist in differential diagnosis via option generation for physician confirmation.

With the seemingly never-ending advancements in digital technologies, the question we get most often from our medtech and healthcare clients is "Should I pay attention to this?" When it comes to generative AI, the answer is yes, given its power to significantly transform how companies do business and go to market. However, at this time, given the still early days of the technology, significant investment is not needed yet. Instead, beginning to identify and experiment with internal use cases should lay a strong foundation for the future as the technology evolves.

For more information, contact **healthcare@lekinsights.com**.

Endnotes

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