



All in: Why life sciences companies must embrace AI

Artificial intelligence is redefining life sciences, but where does the road go?

A Definitive Healthcare report

Written by:

Ethan Popowitz, Senior Content Writer

Contributions by:

Manu Garg, Head of Customer Success,
Strategic Solutions

Chaitanya Badwe, Director, CS & Client Engagement

Maggy Tieche, Market Research Manager



Suddenly, artificial intelligence (AI) is everywhere, and everyone seems to agree that it has the potential to change everything.

Since the beginning of 2023, AI has dominated nearly every facet of culture. Millions of people are having human-like conversations with ChatGPT and Bard, creating realistic-looking (and fake) visuals of celebrities and politicians with Midjourney, and simulating the voices of the world's most popular singers to create viral AI-generated songs.

The market is ripe for opportunity, and companies large and small are exploring the seemingly limitless possibilities of AI. According to IBM's Global AI Adoption Index, 35% of companies worldwide reported using AI in their business in 2022.

A report by Statista stated that the global AI software market is expected to grow 54% year-on-year

and is forecasted to reach a market size of \$22.6 billion by 2025. The hype surrounding artificial intelligence is tremendous, and, akin to the smartphone revolution, its widespread adoption is likely to be one of the next great technological shifts.

Expectations for the growth and potential of AI in the life sciences space are equally as exciting. Mordor Intelligence valued the global AI in life sciences market at \$2.3 billion in 2023 and projected the value to reach \$7.09 billion by 2028, growing at a compound annual growth rate (CAGR) of 25.23% from 2023 to 2028. Big pharma has also taken an interest in the technology's potential, as half of the 50 largest pharmaceutical companies have entered into partnership or licensing agreements with AI companies.

So much interest and investment in AI is driven by the promise that the technology's applications could redefine the healthcare landscape. And for good reason—biopharma and medical device companies are using AI to create more effective drugs, make robot-assisted surgeries possible, identify treatment-ready patients, save lives, and much more.

The global AI software industry is forecast to reach a market size of

\$22.6B

by 2025






Knowing what's possible with AI, life sciences companies can't afford to stay complacent. In a market that is moving fast, life sciences companies must embrace AI and machine learning (ML) technologies to adapt, grow, and remain competitive.

However, the road ahead may be challenging—there are several obstacles to navigate—and resources may be stretched thin in a tough economic climate. To get a better understanding of how biopharma and medical device companies think and feel about AI, and how they're integrating the technology into their strategies, Definitive Healthcare surveyed 85 leaders, decision-makers, and end-users and conducted interviews with a small handful of individuals at life sciences organizations in July 2023.

The respondents we spoke with are excited about the benefits of AI, but they're also cautious. Many were concerned about AI's impact on the workforce, as well as the accuracy and credibility of the answers the technology delivers. The results of our survey and interviews detail which companies are prioritizing AI and why, and also what their most pressing concerns are.

Both biopharma and medical device companies can use this report to get a deeper understanding of AI's place in the life sciences landscape, as well as how it's being used today, and how it might shape the future of life sciences. You might also use these findings to make more informed decisions around integrating AI and ML into your company's operations or to better equip your company to compete in the dynamic life sciences market.

This report is divided into five parts:

-  **Part I:** Momentum is building fast
-  **Part II:** Opportunities and roadblocks
-  **Part III:** The state of AI in life sciences today
-  **Part IV:** How AI and ML benefit life sciences companies
-  **Part V:** Challenges and concerns with AI

Part I: Momentum is building fast

Serious momentum is building behind the AI and ML movement. While no one can predict the future with absolute certainty, many life sciences companies are eager to integrate the technology into existing and new workflows and pioneer the future of healthcare.

OUR RESEARCH UNCOVERED SEVERAL KEY INSIGHTS:

- 34% of respondents feel they have a lot to learn about AI
 - 48% of respondents say their company has an average or higher level of AI adoption
 - Large biopharma and medical device companies are more likely to have an average or higher level of AI adoption than their smaller counterparts
-
- Respondents shared that they have heard **AI can help healthcare practitioners:**
 - Diagnose diseases earlier (72%)
 - Create personalized care plans (53%)
 - Improve coordination & communication (42%)
 - Help patients become more actively involved in their own care (39%)
-
- Mining unstructured data, supporting early disease diagnosis, and identifying patients for clinical trials were among the **top three use cases** that would most benefit from AI
 - Mining unstructured data (66%)
 - Disease diagnosis (60%)
 - Clinical trials (49%)
-
- How AI keeps data secure, ensuring AI uses high-quality data, and the technology's ethical implications are among the **top three challenges** and concerns surrounding AI adoption
 - Security (76%)
 - Quality (67%)
 - Ethical concerns (54%)

Part II: Opportunities and roadblocks

Companies and consumers alike are enthusiastic about what AI and ML are capable of, but the rapid popularity and growth of AI has left many feeling cautious. Discussions surrounding AI's clinical and ethical implications are ongoing and particularly fierce within the life sciences community.

While the road ahead should be carefully navigated, integrating AI will likely bring sweeping, positive change in healthcare. The survey and interviews we conducted uncovered five important benefits that biopharma and medical device companies should consider, including how AI helps:

1. Uncover insights from unstructured data sources
2. Support earlier disease diagnosis
3. Identify patients for clinical trials
4. Accelerate drug discovery and development
5. Optimize marketing and sales activities

As we explore in Part IV of our report, these benefits will likely be the most transformative within the life sciences field, and companies may grow faster and be more competitive if they integrate AI into the above use cases. Before any decision is made, however, companies should be aware of the roadblocks they face.

THREE OF THE MOST CRITICAL ROADBLOCKS ARE:



Keeping patient and confidential data private and secure



Ensuring data used to train AI models are of high quality



The ethical implications of AI eliminating or replacing jobs

Part III: The state of AI in life sciences today

Artificial intelligence refers to the development of computer systems that enable a machine to mimic human intelligence, such as being able to see, understand, respond to communications, analyze data, and more. It also encompasses applications of data science like machine learning (ML), deep learning, and natural language processing, which allow computers to ingest and analyze information and reach their own conclusions.

Machine learning, a branch of AI and computer science, focuses on how machines can be trained to perform tasks and learn and improve from experience. Algorithms enable an ML system to make **informed decisions** based on insights mined from large data sets. Generally speaking, the more data used, the better the machine learning algorithm will be.

As the technology behind AI and ML advances and becomes more pervasive in the mass market, new applications will also emerge in the life sciences space.

Despite significant buy-in, leaders admit they have a lot to learn about AI

From our survey, many life sciences experts shared that their understanding of the capabilities, benefits, and implications of AI is not as comprehensive as they would like.

In Figure 1, survey respondents were asked to rank their own understanding of AI and ML on a 5-point Likert scale, with a “1” indicating that they believe they “have a lot to learn” and a “5” indicating they believe they are an expert. Respondents included varying levels of end-users, decision-makers, and executives from data science and analytics teams, business development, marketing, and medical affairs.

Most notably, of all participants who responded to this survey question, none considered themselves “experts” (score of 5) in artificial intelligence and machine learning.

In fact, the majority of participants answered that their level of understanding landed on a “1” or a “2.” Among all respondents, more medical device leaders (43%) indicated that they “have a lot to learn” about AI and ML compared to respondents in the biopharma space (23%).

This sentiment aligns with two of the challenges survey participants shared: (1) AI and ML are complex to understand, and (2) there is a perceived lack of skilled talent capable of leveraging AI to its fullest potential.

HOW LIFE SCIENCES LEADERS RANK THEIR UNDERSTANDING OF AI AND ML

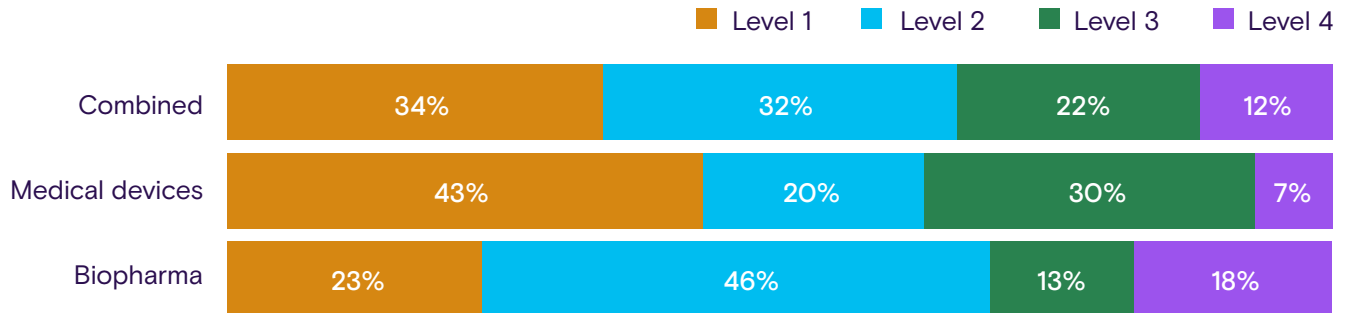


Fig. 1 A 5-point Likert scale showing how respondents rank their own understanding of AI and ML. A “1” indicates they have a lot to learn, and a “5” indicates they are an expert. No respondent indicated their understanding of AI and ML was a “5.” Data sourced from a Definitive Healthcare survey conducted in July 2023.

While we explore the main challenges and concerns biopharma and medical device leaders have with these technologies later in this report, the AI knowledge gap in the market indicates that more needs to be done to educate and train life science professionals at all levels on the capabilities of the technology. To overcome this lack of understanding, organizations may consider:

- Investing in workshops, webinars, and other training programs for staff to learn the basics of AI and its applications in life sciences and healthcare.
- Prioritizing transparency and open communication to build trust and understanding around the use of AI.
- Partnering with technology companies to develop AI pilot programs that allow for experimentation with AI in a safe and controlled environment.

The knowledge gap paints a conflicting picture of how life sciences leaders understand and use AI. While professionals at all levels within biopharma and medical device companies express a desire for more knowledge and training on the benefits and detriments of AI, the average consumer does not hold such a cautious attitude. A 2022 Blumberg Capital survey revealed that U.S. adults have a positive perception of how AI can improve healthcare and are more likely to embrace AI-driven solutions than ever before. More than 80% of participants of the Blumberg Capital survey believe AI will improve healthcare delivery, increase collaboration, and lead to better quality healthcare data.

For life sciences leaders, however, the stakes are higher—which may explain why they feel more cautious about AI’s rapid expansion. As we’ll see in Part V, many

leaders shared that implementing AI and ML in their day-to-day operations is a considerable challenge. A lack of skilled talent and the general complexity around how to best leverage the insights gleaned from AI are two more obstacles the industry must navigate. Altogether, there may be a sense of risk and “venturing into the unknown” when it comes to AI in the life sciences market.

While no one can predict what the future may hold, both business leaders and consumers share a tangible excitement and readiness for AI to transform healthcare. However, the cautious perspective of many life sciences decision-makers suggests that investments in AI need to be made carefully and strategically.

Similar rate of AI adoption among biopharma and medical device companies

Despite survey participants expressing their desire to learn more about the capabilities and implications of AI and ML, many life sciences organizations have already adopted and use AI for a variety of functions.

In Figure 2, respondents shared the degree of AI and ML adoption at their company. Participants were asked to rank adoption based on a 10-point Likert scale, where a “1” indicated no adoption of AI/ML technology, a “2” indicated little use, and a “10” indicated that AI and ML were heavily used throughout the company.

Notably, no survey respondents ranked their company’s level of AI and ML usage at a “9.” Again, a perceived lack of skilled talent and the complexity around integrating AI and ML may be why we’re not seeing a higher level of adoption within life sciences companies currently. Unfortunately, larger companies are more easily equipped to address these problems than their smaller counterparts. Simply put, **larger companies are more likely to adopt new technology**, have more money to invest in expertise and resources, and may even have more data to feed to AI algorithms. For smaller companies, AI may not be part of the picture yet.



Useful AI models need large, high-quality datasets, a luxury mostly available to larger life sciences companies.

The availability of data and, more importantly, how it’s gathered, are also hindering AI adoption. As we explain in Part V, medical data is often difficult to collect and access, as data may come

from disparate sources that are old, incomplete, or incompatible with a company’s existing infrastructure. Without large, high-quality datasets, it can be difficult to build useful AI models. However, as one respondent puts it, “The juice is worth the squeeze.” Our [e-book](#) outlines the step-by-step process your internal teams should take to prepare your company’s data infrastructure for AI integration.

Only 7% of participants believed their organization had a high adoption of AI and ML and heavily used the technology in daily business. Of the 7% of participants who answered this way, all of them indicated they worked in the medical device industry.

RESPONDENTS RANK THEIR COMPANY’S LEVEL OF AI/ML ADOPTION

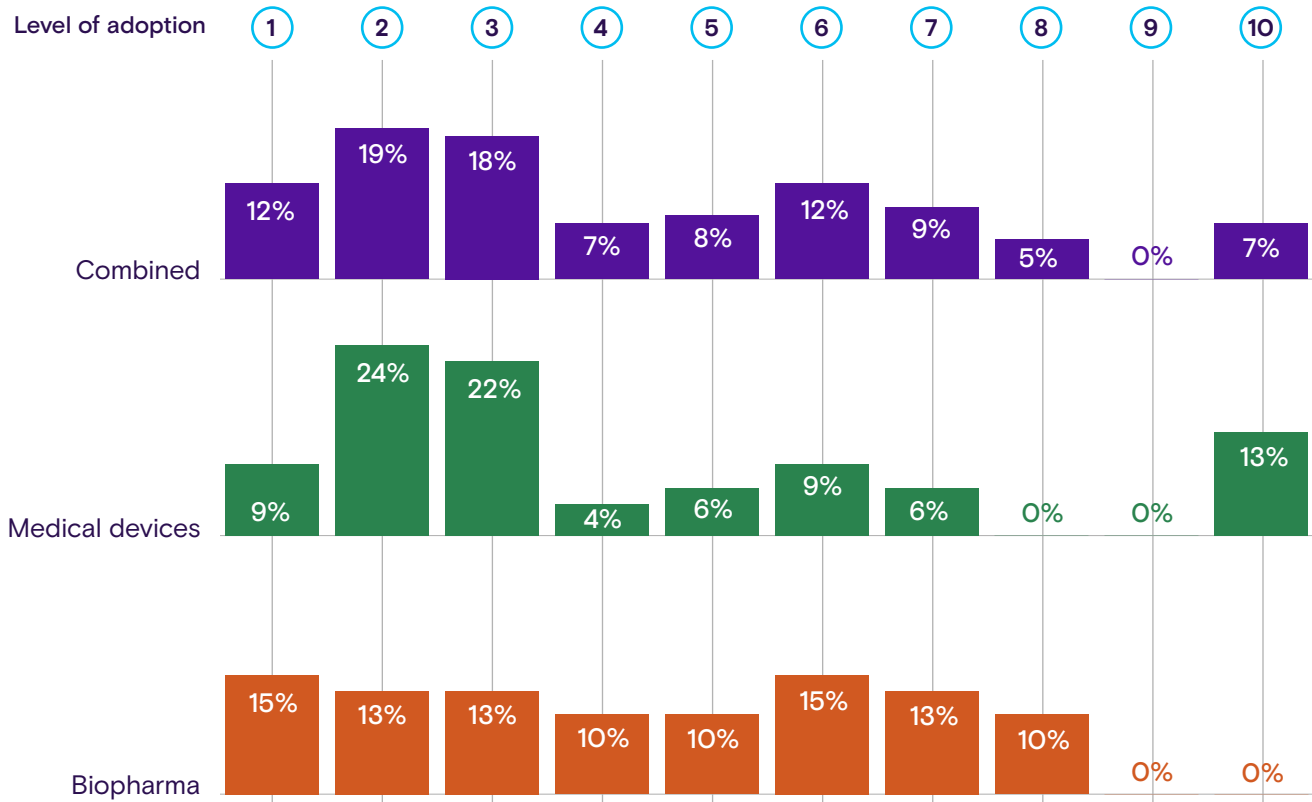


Fig. 2 A 10-point Likert scale showing how respondents rank their company’s level of AI/ML adoption. A “1” indicates no adoption, and a “10” indicates that AI/ML is heavily used throughout the company. Data sourced from a Definitive Healthcare survey conducted in July 2023.

When looking at how participants rank their company’s AI adoption, larger companies tend to have a higher degree of usage (data not shown). When comparing large and small medical device companies, 44% of respondents working at a large company ranked AI adoption as a “6” or higher, with half of those respondents assigning their company a rank of “10.” Comparatively, 49% of respondents at small medical device companies said their organization has zero or little AI/ML adoption. Only 12% of small medical device companies share they haven’t adopted AI technology at all.

The results for biopharma companies look more evenly split. About 55% of small biopharma companies stated they have zero or little AI/ML adoption. However, 33% of respondents at small biopharma organizations indicated they had a greater than average level of AI usage. The results are also fairly split among large companies, with 42% indicating less than average adoption of AI and 56% of respondents saying their organization frequently uses AI.



Part IV: How AI and ML benefit life sciences companies

Artificial intelligence has become a game-changer for the life sciences industry in recent years. Biopharma and medical device companies use machine learning algorithms, predictive analytics models, natural language processing, and other techniques to make sense of the complex—and vast—web of healthcare data, from claims and codes to lab results and physician notes. As a result, AI is helping scientists and researchers gain deeper insights, make more informed decisions, streamline and improve upon existing workflows, and much more.

Companies are incorporating AI and ML into the devices and treatments that help save lives, but there's plenty of opportunity to utilize the technology more widely for day-to-day applications, too. Internal operations such as marketing, sales, data analysis, and more are new use cases for AI and ML, specifically to ingest and analyze large amounts of data to inform more strategic decision-making.

We identified five life sciences use cases that would benefit the most from AI, including:

1. Mining unstructured data
2. Supporting earlier disease diagnosis
3. Identifying patients for clinical trials
4. Accelerating drug discovery and development
5. Optimizing marketing and sales activities

Respondents also indicated, to a lesser extent, that AI is being used for supply chain forecasting, summarizing data and improving the quality of clinician notes, identifying **social determinants of health (SDOH)**, and supporting a **primordial prevention** approach to care (data not shown in Figure 3).

USE CASES WHERE AI AND ML ARE HELPING LIFE SCIENCES COMPANIES THE MOST

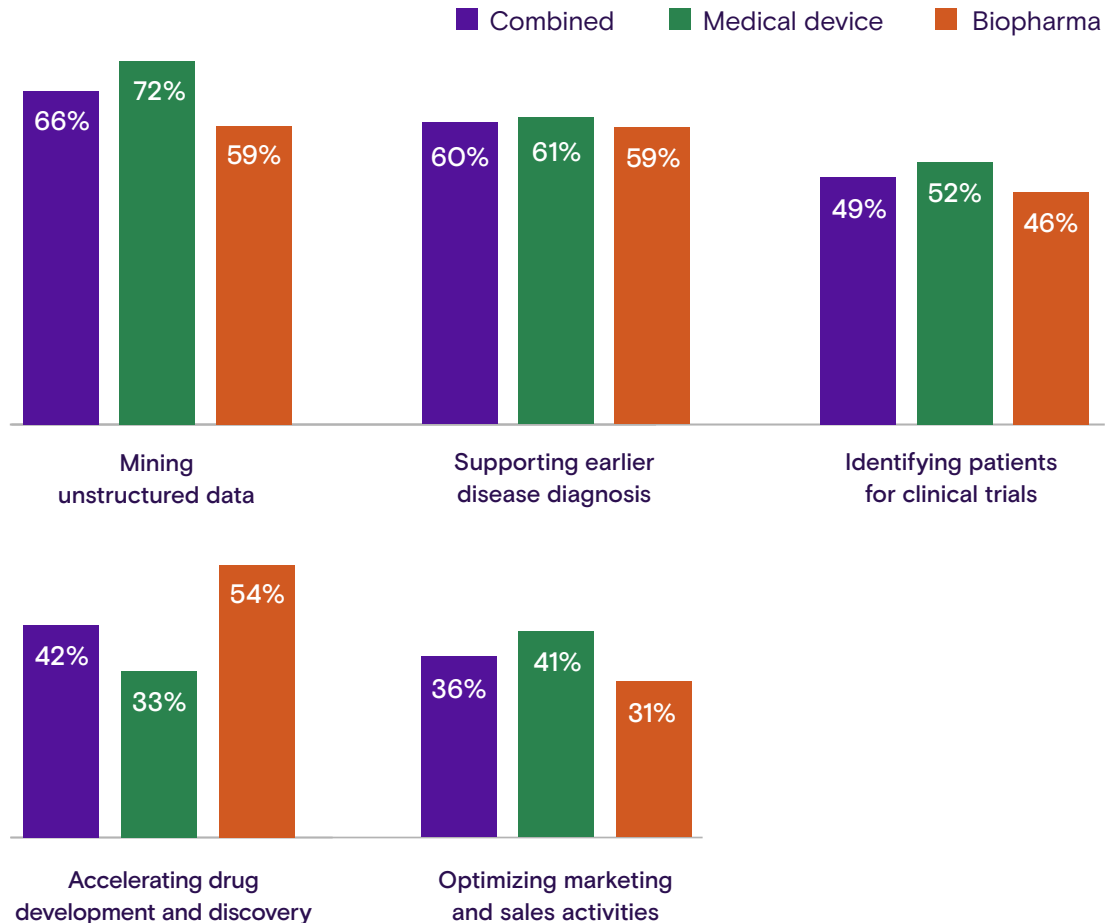


Fig. 3 The top five use cases respondents believe would benefit the most from AI/ML. Data sourced from a Definitive Healthcare survey conducted in July 2023.

It's important to note that individual biopharma and medical device companies may value these use cases differently. Priorities are often set by a mixture of internal goals and external factors. Among all the possible ways AI can benefit a company's operations, the five we identified align with what we've heard in the market and may be most important to consider when planning for the future.

1. Mining unstructured data

It's no secret that the healthcare industry generates a lot of data. In fact, healthcare data accounts for approximately **30% of the world's data volume**. This metric is expected to increase year-over-year, as RBC Capital Markets forecasts that the CAGR of healthcare data will reach 36% by 2025 and will continue to grow faster than sectors like media and entertainment, financial services, and manufacturing.

According to NetApp, **80% of all healthcare-related data are "unstructured data."** Examples include medical images like X-rays and mammograms and written narratives like radiology reports and clinical notes.

Unstructured data can be immensely valuable to healthcare professionals, as it often captures the severity of a patient's health condition and even the nuances of their environment. However, unstructured data can be complicated to deal with as healthcare organizations can amass it quickly and haphazardly, which can make analyzing the dataset for trends and patterns incredibly difficult and time-consuming.



AI can help healthcare organizations make sense of the tangled web of data across the healthcare ecosystem.

AI can be transformative here. Organizations can use artificial intelligence to **make sense of the tangled web of data** across the healthcare ecosystem, which can then help decision-makers predict

future health costs, design more targeted interventions, identify high-risk patients, and more. For example, an AI system using natural language processing (NLP) can potentially analyze electronic health records and social media posts to **recognize early warning signs of an influenza outbreak** in real time. Then, healthcare organizations can track the spread of the outbreak and take measures to mitigate its impact.

AI can also take the heavy lifting out of reviewing patient data. In one study by the **Fred Hutchinson Cancer Center**, researchers used **Amazon Comprehend Medical** to review 10,000 medical charts per hour to find patients with the right inclusion criteria to be enrolled in a clinical trial.

2. Supporting earlier disease diagnosis

Diagnostic imaging has been rapidly evolving in recent years, thanks in part to AI and ML being heavily integrated into imaging technology to help better diagnose patients and reduce human error.

Life sciences organizations are using AI to improve both the speed and the accuracy of medical imaging systems and standardize the process of diagnosis. According to our survey, 60% of participants shared that early disease diagnosis—particularly through medical imaging—could benefit greatly from further investment and advancements in AI and ML.

Today, the [OSIC Data Repository](#) helps practitioners make quicker decisions and more accurately predict patient outcomes. This open-source medical image library can be used by AI systems to complement existing datasets and/or to support the

discovery of biomarkers that could accelerate diagnosis and improve understanding of diseases.



Research has shown that AI can detect features in medical images that the human brain cannot perceive, helping providers diagnose diseases earlier.

AI and ML have also proven to be crucial in cancer diagnosis, as the technology can detect features in medical images that cannot be perceived by the human

brain. In a study by the National Cancer Institute, [AI was used to detect specific gene mutations](#) from tumor pathology images of cervical and prostate cancer. Researchers from the study reported that the AI was [twice as accurate](#) at positively identifying precancerous changes that would require medical attention than doctors were. The AI was also able to predict seven years into the future the patients who would likely develop a precancer and those who wouldn't.

Supporting early disease diagnosis is important for both patients and providers alike. For patients, an early diagnosis helps them take a more proactive role in managing their condition. It can also be lifesaving in cases of breast and colon cancer. Also, there is strong evidence that an early diagnosis helps dementia patients [continue to live independently longer](#), take advantage of resources, and plan for the future. For healthcare providers, early and accurate diagnosis can improve the [effectiveness of treatments](#), mitigate long-term complications, or even help [stop an outbreak](#).

3. Identifying patients for clinical trials

Clinical trials offer pharma and biotech companies valuable information, such as how a treatment improves the quality of life in a patient, a treatment's cost effectiveness, the clinical value of a diagnostic test, and more. These results have an incredible impact on the company's decision-making moving forward. This perspective is shared in our survey, as nearly 49% of participants believe that AI and ML can help them better and more quickly identify patients for clinical trials.

Difficulty enrolling patients in a clinical trial has shown to result in costly delays or even termination of the trial. In fact, multiple analyses report that about **80% of all trials fail** to meet their original enrollment deadline, and **55% of trials are terminated** for failure to achieve full enrollment.

However, developments in AI have been shown to dramatically accelerate the recruitment process. Through a combination of ML algorithms, natural language processing, and **optical character recognition** (the process of converting an image of text into a machine-readable format), AI can quickly read large datasets and

identify candidates who meet the trial's specific criteria. For example, a study found that **AI reduced patient screening time** by 34% and increased enrollment by 11%.

The same algorithms and techniques can also improve

patient matching accuracy and speed. Mayo Clinic's use of IBM's Watson for clinical trial matching led to an **80% increase in enrollment** in clinical trials for breast cancer in the 11 months following implementation. In another study where Watson was used, AI helped to screen and process 90 patients against breast cancer protocols in only 24 minutes, which was a 78% reduction in time compared to the 110 minutes it took for a human coordinator. In a clinical trial studying patients with lung cancer, **the AI matching system** was able to reliably exclude ineligible patients with about 95% accuracy and identify eligible patients with about 92% accuracy. Altogether, more accurate and reliable data leads to more effective clinical trials and a better end product.



AI and ML are revolutionizing clinical trial enrollment, making it easier and faster to find the most suitable candidates.

4. Accelerating drug development and discovery

One of the most important areas of life sciences where AI and ML can have a profound impact is in the early stages of drug discovery and development. According to our survey, about 42% of participants shared that this facet of the biopharma

42%

of participants believe AI will greatly benefit drug discovery and development.

industry would benefit the most from greater investment and advances in AI.

Artificial intelligence can assist in optimizing drug formulations and delivery systems, ensuring better bioavailability, stability, and potentially improve patient outcomes. It's also

a key reason so many viable COVID-19 vaccines were made available in the U.S. After China made the gene sequence of the virus available to the global healthcare community, AI and agile computer systems uncovered vaccine and drug targets quickly. The power of AI helped condense the preclinical development process of a trial-ready product from years to months.

Another area of early drug development that can benefit from AI is the identification of molecular targets and compounds that have the most desirable properties to treat a given disease. Finding the right molecular target and compound is often a slow and labor-intensive process that involves the manual curation of large amounts of biological and chemical data. AI and ML accelerate this process by automating and streamlining the analysis of large datasets, leading to the discovery of potential targets based on their biological relevance to the pathophysiology of the disease, potential efficacy, and interaction with other molecules. This can save the research team weeks or months and allows them to focus on molecules that are more likely to be effective and safe.

Today, many pharmaceutical companies are collaborating with AI companies or developing in-house AI applications to accelerate the early phases of drug discovery and development. Novartis and Microsoft have a long-standing partnership and founded the Novartis AI Innovation Lab, which helps scientists find troves of insights buried in thousands of past experiments, all in a few clicks. More recently, Inscilico Medicine's drug for idiopathic pulmonary fibrosis, the world's first AI-discovered and designed drug, is now undergoing Phase II clinical trials in the U.S. and China.

5. Optimizing marketing and sales activities

The life sciences industry is incredibly complex and fiercely competitive. Even in small territories, marketing and sales teams must untangle a web of facilities, providers, payors, and patients, all connected by multiple affiliations, partnerships, technologies, and treatments.

A robust marketing and sales strategy is essential for life sciences companies as it makes them more competitive, credible, and profitable. It can also help build brand awareness, navigate regulatory hurdles, communicate a company's value proposition more effectively, and much more. Altogether, a solid marketing and sales plan can help to ensure life sciences companies maximize their ROI and grow in this highly competitive market.

This is where artificial intelligence has the power to deliver. AI systems unify vast amounts of data across the healthcare ecosystem and leverage ML to help life sciences companies analyze trends, uncover new opportunities, guide decision-making, and improve their strategies. According to our survey, 36% of participants feel that AI and ML can help life sciences organizations improve their marketing and sales initiatives.

Here are four ways AI can help marketing and sales teams optimize their operations:



Part V: Challenges and concerns with AI

While artificial intelligence and machine learning have a tangible potential to revolutionize healthcare and influence the life sciences market, there are many challenges that still need to be addressed. Three of the most important roadblocks that companies should consider when integrating AI are:

- Keeping data private and secure
- Ensuring data used to train AI models is high quality
- Accounting for the ethical concerns of AI, such as how it will impact the workforce

THE PROBLEMS THAT POSE THE BIGGEST OBSTACLES TO AI/ML ADOPTION:

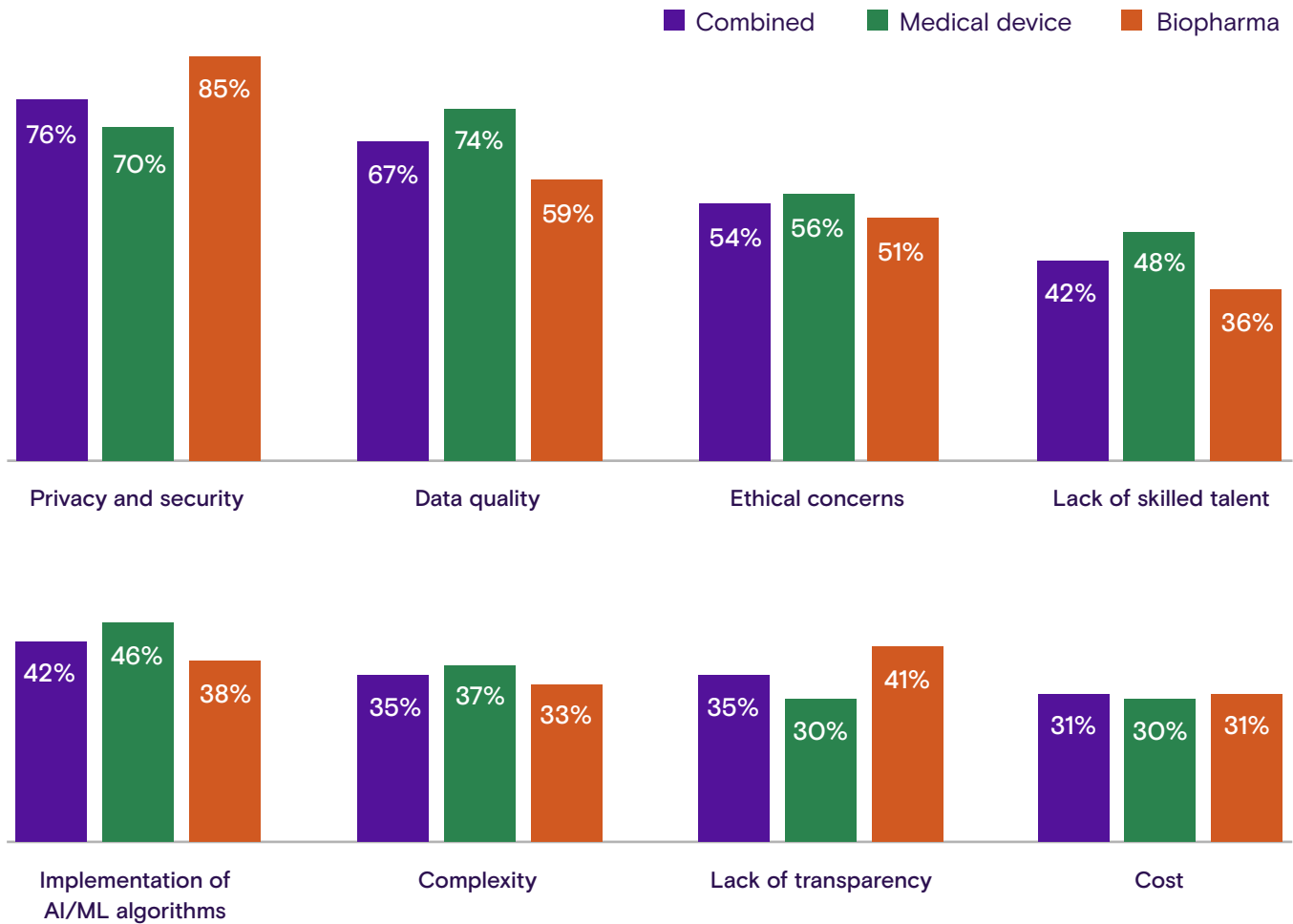


Fig. 4 Eight of the most important roadblocks to AI adoption. Data sourced from a Definitive Healthcare survey conducted in July 2023.

Survey respondents also indicated other challenges, such as a lack of skilled talent, difficulties implementing AI/ML algorithms, complexity, lack of transparency, and cost. All of these obstacles are important and must be addressed as life sciences adapt their strategies to accommodate AI's growing popularity. However, the top three challenges pose the greatest obstacle to AI adoption.

Privacy and security

The digital security of healthcare institutions is a growing concern. Each year, it seems there is an increasing number of cyberattacks against healthcare systems, which are seen as easy targets. Survey respondents indicated that how well-protected AI systems are at keeping data secure was chief among their concerns, accounting for 76% of all responses.

Their concerns are warranted: according to Definitive Healthcare data, there were 693 healthcare-related data breaches in 2022, exposing the private health information of more than 52 million people. Data breaches and attacks like these can be devastating to both patients and providers alike, resulting in longer lengths of stay at hospitals, delays in critical procedures, and increased complications and mortality rates.

In an article written by global professional services firm Marsh McLennan, there are a multitude of cybersecurity-related threats that AI systems may be particularly vulnerable to. This includes system manipulation by malicious insiders or external threats, data corruption, transfer-learning attacks, and more. One of the most



dangerous threats is “**data poisoning**,” which is a cyberattack that manipulates the training model used to control machine learning algorithms by tampering with existing data or injecting incorrect data. Successful data poison attacks can lower the overall accuracy of the ML model or have it produce unintended results, “poisoning” all of the findings.

Medical devices may be more attractive targets for cyberattacks, as many may be reliant on network connectivity to function or interact with other devices. To exacerbate the problem, many medical devices are also a gateway into cloud data storage platforms or a hospital’s network, making it even more dangerous should a data breach occur.

In the future, healthcare organizations across the care continuum will need to remain vigilant of their security solutions and where vulnerabilities may lie. Regulation can also help address privacy and data security issues. Recently, the FDA established a **regulatory framework** for the use of AI in the healthcare industry, with information on how to mitigate risk and ensure data is secure. AI is an evolving technology, however, and **regulatory and legislative gaps still exist**. In the years to come, healthcare organizations may need to implement more robust safeguards to maintain the privacy of patient data.

Data quality

In a report by the **National Academy of Medicine**, collecting and reporting on data that is high-quality, inclusive, and equitable is one of the most significant challenges of AI implementation in healthcare today.

A survey respondent sums up the problem succinctly, recalling the adage, “garbage in, garbage out.” According to our survey, 67% of participants see data quality as a critical obstacle to the growth of AI in the life sciences market.



In the healthcare industry, ineffective or unreliable AI is dangerous.

Quality data is needed to train the AI and ML systems to ensure the outcomes are appropriate and fair. If information is missing, inaccurate, or flawed in another way, it will impact the effectiveness of the AI tool. In the healthcare industry, ineffective or unreliable

AI is dangerous—with risks including incorrect predictions or recommendations, misdiagnosis, and the wrongful prescription of treatments.

To ensure the accuracy and reliability of AI, it is essential to prioritize data quality. This means collecting high-quality data from diverse sources, ensuring that the data is clean and free of errors, and addressing any biases. However, the National

Academy of Medicine states that methods to assess data quality are often not standardized or are nonexistent.

Achieving inclusivity within the dataset and reporting is also a considerable challenge. A University of Oxford study found that AI systems used to detect skin cancer risk were less accurate for people with dark skin because very few of the images used to train the model featured people of that skin color. The underrepresentation of a particular race, gender, age, or sexual orientation can foster systemic biases in the AI model and further perpetuate long-standing inequities in how care is delivered.



Survey participants shared that data quality can be improved by implementing standardized procedures and policies for data collection, management, and use. Data may need to be cross-validated from multiple sources to best determine trustworthiness, and subject matter experts may need to be involved in validation to ensure equity and inclusivity in training and deploying AI and ML models. Where possible, patients and other stakeholders could be involved to ensure that the data collected is relevant and useful.

Ethical concerns

Artificial intelligence is only beginning to penetrate the workplace, but it's causing business leaders to reconsider how their companies are run. Organizations are turning to robots and automation technology to harvest crops, pack pallets, assemble cars, perform customer service, serve food, and more.

AI can do in seconds what people need hours or days to accomplish. These are undoubtedly transformative achievements, but simultaneously raise intriguing but complicated questions about the future of our workforce.

Many people fear that AI-powered technologies will eliminate jobs—something that has been happening for years. Since 2000, about **1.7 million manufacturing jobs have disappeared** as their tasks have become automated and human workers became obsolete. And according to forecasts by the **World Economic Forum**, AI may eliminate 85 million jobs by 2025.

Leaders and decision-makers across the life sciences industry share these same concerns. About 54.1% of survey respondents felt that the ethical implications of AI implementation—whether AI will replace human workers—is one of the most concerning obstacles to the growth and use of the technology.

Despite these legitimate and justifiable concerns, many survey respondents are optimistic about the future and believe that AI will create more jobs and potentially create new ones. In fact, the same World Economic Forum report that predicted that



AI would displace 85 million workers also stated that AI will generate 97 million new ones by 2025—an overall addition of 12 million jobs.

Often, the negative consequences of automation are at the heart of discussions around AI's potential impact on the workforce. In 2016, Geoffrey Hinton, considered to be the “**Godfather of AI**,” painted a grim picture for radiologists following recent developments in new deep learning technologies capable of reading medical images. Hinton said, “If you work as a radiologist, you are like the coyote that’s already over the edge of the cliff but hasn’t yet looked down.”

While Hinton would later become a vocal critic of the same deep learning technology, it’s likely that his original conclusion is one felt by many who fear the effect of AI in the workplace. What Hinton probably overlooked, at the time, was that reading medical images is just one of dozens of tasks radiologists do—and many of them are too nuanced or sophisticated for AI (in its current state) to automate or replace. Where modern AI and deep learning models are trained for singular tasks, **radiologists** read and interpret medical images and also consult with other physicians, treat diseases, perform medical interventions, discuss procedures and results with patients, and more.

AI isn’t ushering in the end of work as we know it. However, this technology arguably will transform how work gets done—and what kind of work needs doing. Many survey respondents feel that AI can help healthcare practitioners refocus on providing patient care and minimize time spent on administrative tasks. The speed and accuracy AI models have can give doctors and nurses access to knowledge faster

and easier, potentially leading to earlier and more precise diagnoses. At an organizational level, predictive analytics models can help hospitals and other organizations manage staff more effectively, efficiently allocate resources, and develop more

proactive and strategic plans. Ultimately, many in the life sciences industry believe that AI will lead to better patient outcomes, increased productivity, and improved care delivery.

At the same time, however, the new types of jobs that AI will create may differ from those being lost. Some technology experts believe that advancements in AI will place greater importance on jobs that require **problem-solving, creativity, and empathy**, presenting new opportunities like never before. But when one door opens, another closes. The automation and transformation of existing jobs may **exacerbate inequality**, lead to discrimination against workers, and close off opportunities for minorities and marginalized groups.



Some technology experts believe that advancements in AI will place greater importance on jobs that require **problem-solving, creativity, and empathy**...

Nail it, then scale it

It is an exciting time for life sciences, and AI will undoubtedly play a significant role in shaping its future and the trajectory of the greater healthcare landscape.

Automation, machine learning algorithms, and predictive analytics are helping biopharma and medical device companies make treatments and devices that save patient lives and deliver access to care faster and more efficiently than ever. At the same time, AI can help life sciences companies make more informed decisions, compete more effectively in the market, save time, and save money.

However, there are still many obstacles to AI adoption to navigate, and many justifiable fears and concerns shared by life sciences experts and the patients they serve must be addressed. AI models are only as effective as the data they are trained on, meaning it is critical that data is high-quality, free of bias, inclusive, secure, meets regulatory compliance, and is ethically sourced. Filling the knowledge gap and educating people on the capabilities, benefits, and implications of AI may be the first and most important challenge to overcome.

Despite these challenges, the benefits of AI are almost too good to pass up. While AI may define the life sciences landscape for years to come, companies should look to adopt AI with a careful and tactical mindset to maximize investment and maintain a competitive edge.

Moving forward, collaboration within the life sciences industry will be key to overcoming barriers to AI adoption. It will be essential in ensuring that AI genuinely boosts innovation and is ultimately useful to the people it was designed to serve.

Methodology

Information and data collection for this report was gathered in July 2023 via an online survey. Targeted respondents included leaders, decision-makers, end-users, and other professionals in pharmaceutical, biotechnology, and medical device companies. A total of 85 respondents from life sciences organizations of all sizes participated in the survey, holding positions across data science and analytics to business development, sales, brand and marketing, medical affairs, and more. External data is from a variety of sources. All data points are cited and linked throughout.



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