Life Sciences and AI:
A Powerful Partnership for a Resilient Tomorrow

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Overview

Over the last century, the noble goals of medical science—to care, cure, and comfort[i]—have found extraordinary allies. Some advances that have changed the face of healthcare include anesthesia, penicillin, the ambulance, insulin, blood transfusion, heart valves, X-rays, and telemedicine. Joining that distinguished list of life-sustaining champions is Artificial Intelligence (AI), a powerful ally in the battle against disease and disabilities. For an industry challenged by the pressure of growing chronic diseases and shortages in the workforce, the technology promises not just to help professionals perform but also to transform the industry.

The forecast for the growth of AI provides a hint of the role it will play in our lives. The global market for AI in life sciences (LS) is expected to grow rapidly from $1.62 billion in 2021 to $12.67 billion by 2030. That is a CAGR of 29.3% during the forecast period. AI will be the new superpower in the hands of healthcare professionals.
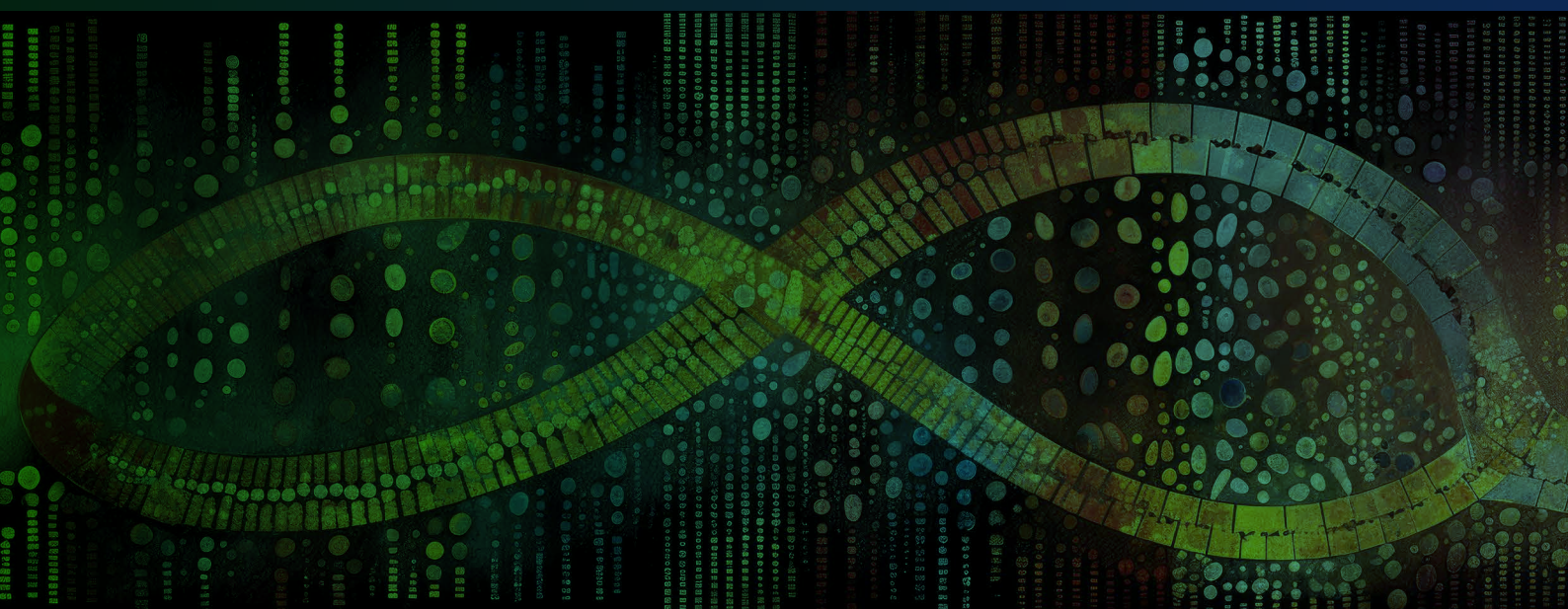
The role of the pandemic in accelerating AI adoption

AI is already revolutionizing the four foundational pillars of healthcare delivery: enhancing the patient experience, accelerating drug discovery, reducing the cost of care, and boosting caregiver capability.

The surge of interest in AI is remarkable. Chiefly responsible for the interest has been the COVID-19 pandemic.

AMIT GARG
Head of Engineering (Data Science & AI/ML Platform)
ResMed

"Before the pandemic, AI was of interest to industries such as finance," says Amit Garg, Head of Engineering (Data Science & AI ML Platform) at ResMed, a mid-sized manufacturer of products used to treat respiratory conditions. Now, "Every minute data point has become important to LS."

Garg cites the example of the rumpus around drugs that activate the GLP-1 hormone, aid weight loss, increase the effectiveness of diabetes treatment, etc. "There is confusion around these drugs, But now we have data that can be used to extract real insights."

The pandemic was a watershed event for LS. A Canadian company, BlueDot, used AI to identify a cluster of unusual pneumonia cases around a market in Wuhan nine days before the World Health Organization released its alert on the coronavirus emergency. BlueDot achieved this by analyzing the data it gathers for over 150 diseases worldwide every 15 minutes from sources like the Center for Disease Control, population and climate data from satellites, and by scanning over 100,000 health-related articles in 65 languages published online daily. BlueDot was also able to accurately anticipate eight of the first ten cities that would import the coronavirus[ii]—today, with the broad awareness and endorsement of AI

in LS, the same information would have helped nations prepare and contain the virus to save thousands of lives.

The BlueDot/Caronavirus example, additionally, puts the difference between data analytics (which leads to a deterministic output) and the current AI models (which drive a more probabilistic output) into perspective.

MARLABS PERSPECTIVE

"If we are interested in identifying clinical sites that have been most optimized or profitable in the last five years, that is an output you are going to get from data analytics, but if you embed a self-evolving learning model that breaks the boundary of any relations to the underlying data, we get a probabilistic analysis to prescribe which will be the most optimized sites for the next five years."

Given the rapid technological evolution we are seeing, it is necessary to understand the difference between analytics, AI, and Generative AI. This is especially necessary because,

DURGA AMBATI
Practice Director - Life Sciences
Everest

as Durga Ambati, the Practice Director of Life Sciences Information Technology Services at Everest, points out, "There is tons of jargon being thrown around. Even automation solutions are being repackaged with a Generative AI label."

The ferocious proliferation of unstructured and scattered data is blindsiding the industry. There is no way to monitor it, and the industry is eager to embrace a technology that can solve this challenge. Ambati's recommendation: Look for the business value that can be achieved from the underlying technology; use any technology if it translates into the outcome you are looking for.

Enhancing the Customer Experience

So, what is the best fit for AI in the LS industry? Raj Venkata, Senior Director of AI-powered digital experiences at Align, a manufacturer of 3D digital scanners and advanced orthodontic interventions, sees LS as a journey driven by business and patient decisions. It traverses patient acquisition, diagnostics, treatment planning, and monitoring.

RAJ VENKATA
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"These care continuum steps haven't changed," says Venkata. "What has changed is our ability to apply different types of AI or Automation to each of these steps to make processes for hospitals, clinicians, and patients more efficient."

For example, Venkata believes that Generative AI will be used at the diagnostic stage to understand clinical conditions, arrive at baseline treatment, and examine therapies that may be relevant outside prescribed medical guidelines. This also helps address the talent and experience shortage in the industry because Generative AI will make it possible for clinicians to interact with AI models, ask questions, and get answers. There could be complex cases where the clinician does not have adequate experience. AI could look at standard clinical guidelines and emerging clinical evidence to provide answers. It is then up to the clinician to decide on the therapy.

On the remote monitoring side, AI will be more focused on exception-based care to keep the patient stable. This is an important area where AI is being applied, resulting in industry evolution.
Ambati believes that remote monitoring is helping the industry expand from a pure product-centric model to a service-centric model. This, she says, is a post-pandemic evolution in which physical devices are supplemented by apps that arm them with the ability to deliver smart solutions.

Products and applications are no longer simplistic. For example, until a few years ago, devices would remotely transmit patient data every quarter. The clinician would check the data to see if everything was okay and submit the paperwork for reimbursements.

But these devices and apps have changed. They now ask patients several questions to arrive at a holistic view of patient progress: How is your diet going? How are you feeling today? Etc. The backend analytics then help shape actions. The app may, for example, suggest that two out of ten patients need to see a nephrologist, another may need attention from a cardiologist, etc. These intelligent, customer-centric capabilities have arrived on the LS horizon.

Ambati's experience supports the growing emphasis on Customer Experience. She says a pre-pandemic study ranked Customer Experience #4, but it ranked #1 post-pandemic. Unlocking experiences at every stage for patients, care providers, researchers, and sales teams has become important.

Can AI deliver a better experience by helping surgeons plan and prepare for a procedure before entering surgery? Yes. Mountains of patient data points are available to enable this. Patients themselves can be made to prepare better for their surgery based on their personal conditions and behavior patterns.

The explosion in data combined with AI is helping advance the cause of Customer Experience. However, Ambati's experience suggests that the areas to watch are the clinical (R&D) and commercial side of LS. While the clinical side has, historically, seen significant and consistent technological investments, the exciting development could be on the commercial side.

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Practice Director - Life Sciences
Everest

"There is appetite on the sales side to use AI," reveals Ambati, "While no one wants a disaster at the hands of sales—we are a deeply regulated industry—there is considerable chatter on the commercial side because AI will spell better business."

Accelerating drug discovery and reducing the cost of care

On the R&D side, the LS industry has long trusted its ancient, time-worn processes. These processes could take over ten years and $3 billion to bring a drug to the market. The pandemic challenged this.

There is a unanimous acceptance that without compromising regulations, the drug discovery and development process can be highly optimized and accelerated.

Drug development pilots are leapfrogging into production, thanks to AI. This is because LS has a more critical imperative to use AI to save millions of dollars and save thousands of lives.

AI investments in drug discovery and development will cross $10 billion in the next 5 to 10 years. He is confident in the numbers because Marlabs recently helped an LS customer leverage AI to transform its entire clinical operations, from patient recruitment to optimizing clinical site selection by 35%. AI did not eclipse advanced technologies such as RPA, IDP, and data management. However, AI has become the primary technology for refactoring drug development.

What Generative AI can do to change traditional LS processes represents a major leap in the industry. Other early examples abound, such as Hong Kong-based Insilico Medicine, which identified a preclinical drug candidate to combat a respiratory disorder causing an irreversible decline in lung function within 18 months at a cost of ~2.6 million[iii], showcasing the cost-effectiveness and efficiency of Generative AI in healthcare. It took just another 12 months to get the preclinical candidate to Phase 1 of clinical trials. Generative AI is driving faster decision-making and narrowing the gap between clinical trials and stringent regulatory approval.

The transformation promises to be even more dramatic in the years to come. Today, LS organizations work in isolation. A company that produces medication for cardiac conditions does not know what a

company designing drugs for people with diabetes is doing. Once Generative AI can begin to (is allowed to by regulatory authorities) aggregate this data, the impact it will have on health care is exponential.

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"As of now, the data is all over the place, in different locations and with different partners," says Garg.

But that will inevitably change, boosting caregiver capabilities.

Ambati says pilot fatigue is noticeable from a Generative AI perspective. LS organizations have realized that Generative AI models are probabilistic, and things can go south. They need a human in the loop and are deploying cases with limited risk. Her experience reflects this. A study by her organization (Everest) of 20 LS enterprises showed that 85% of the investments in AI and Generative AI were made on the R&D side, followed by clinical trials.

Research from the McKinsey Global Institute (MGI) corroborates this. MGI estimates that AI will "generate $60 billion to $110 billion a year in economic value for the pharma and medical-product industriesiv, largely because it can boost productivity by accelerating the process of identifying compounds for possible new drugs, speeding their development and approval, and improving the way they are marketed."

On the commercial side, organizations are not sure about the ROI, which is why AI investments on the commercial side show a sluggish trend.

The unavoidable path of AI

The life sciences industry is on a fast track to becoming AI-driven. Companies that leverage AI and data analysis are poised to be at the forefront of this revolution, enabling them to develop new treatments, personalize care, and reduce costs, all with the goal of improving patient outcomes. The trend suggests that within five years, being AI-first will be a key differentiator for life sciences companies.

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[i] *Paraphrased from Singh A, Singh S: To cure sometimes, to comfort always, to hurt the least, to harm never. Mens Sana Monogr, 2006, Jan-Dec; 4(1):8-9*
[ii] *https://diginomica.com/how-canadian-ai-start-bluedot-spotted-coronavirus-anyone-else-had-clue*
[iii] *https://insilico.com/phase1*
[iv] *https://www.mckinsey.com/industries/life-sciences/our-insights/generative-ai-in-the-pharmaceutical-industry-moving-from-hype-to-reality*

About Marlabs

Marlabs designs and develops digital solutions with data at the center. We leverage our deep data expertise and cutting-edge technology to empower businesses with actionable insights and achieve improved digital outcomes.

Marlabs' data-first approach intersects with custom application development, AI & analytics, digital product engineering, advisory services, digital labs for rapid solution incubation & prototyping, and agile engineering to build and scale digital solutions. We work with leading companies around the world to make operations sleeker, keep customers closer, transform data into decisions, boost legacy system performance, and seize novel opportunities in new digital revenue streams.

Marlabs is headquartered in New Jersey, with offices in the US, Germany, Canada, Brazil and India. Its 2500+ global workforce includes highly experienced technology, platform, and industry specialists from the world's leading technical universities.

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