

Pharma Leads the Way with Big Data Investment

► As the pandemic creates urgency, the pharmaceutical industry is pushing ahead on data-driven solutions.

Life-sciences companies are embracing big data as a way to drive innovation, with some indications that the industry has moved more aggressively on implementing data-led solutions in the past year than many other industries.

A 2021 survey from NewVantage Partners (NVP) found that across all industries, 48.5% of companies are driving innovation with data, while only 39.3% are managing data as a business asset, and only 24% have a data-driven organization. The pandemic, however, created new urgency around big data and analytics for life-sciences and healthcare organizations, pushing businesses to achieve data-driven outcomes. According to the NVP survey, among life-sciences and healthcare companies there has been a far more urgent push to big data, with 57.1% saying they are managing big data as a business-critical asset, 66.7% leveraging data for innovation, and 45.5% achieving transformational outcomes from big data.

Across all industries, 96% agree that big data and artificial intelligence programs were producing results; furthermore, nearly two-thirds of companies now have appointed a chief data officer.

To overcome challenges, companies are turning to technology innovations and the adoption of big data, which more and more companies see as integral to becoming or remaining competitive.

Data and the Pandemic

During the pandemic, scientists globally leveraged multiple sources of big data — from real-world evidence data to new genomic and epidemiological data, to medical records, and beyond — to drive innovation.

Both public health organizations and life-sciences companies were under intense pressure to manage and report data quickly during the pandemic — both to understand the spread of the virus and to hasten vaccine development and rollout.

More and more, life-sciences companies are investing in big data to mine anonymized patient data with the goal of improving drug discovery, personalized medicine, digital interventions to improve the patient experience, and commercialization programs.

One company that has put big data at the top of its agenda is Novartis. The company has gathered millions of patient-years of data from clinical trials and, as of 2018, the Novartis Institutes for BioMedical Research (NIBR) had approximately 15 petabytes of data, including scans, images, videos, chemical information, and other research findings alongside a library of 1.5 million compounds. NIBR employs both scientists and data scientists to drive innovation. Novartis' Chief Digital Officer Bertrand Bodson has led this initiative and sees its potential to, for example, find data from the company's drugs to potentially treat other diseases or to better stratify patients for truly personalized medicine.

Another company that has invested heavily in big data, particularly in response to COVID-19, is Janssen, which has used data science to guide vaccine research as well as to assess return-to-work policies.

"By combining several types of data into an advanced analytical model using new techniques, we are driving insights and leading the way to a deeper understanding of this disease in order to help shape our clinical development program," says Janssen's Chief Data Officer and Head of Global R&D Strategy and Operations Najat Khan.

Among the big data initiatives from Janssen are a global surveillance dashboard, drawing data at the country, state, and county level that helped to guide where to test the vaccine. And, to ensure the accuracy of the data, a team constantly scours data sources across different territories, and that data is curated, ingested, and integrated into the dashboard daily. The company also harnessed data to determine who might be at greatest risk. It leveraged longitudinal data from a global COVID-19 registry about areas where the disease was most

prevalent, as well as real-world databases, and published studies to better understand the way the disease impacts different populations. The company has also made use of data science to determine which labs to keep open, the number of staff that can safely be on site, and how best to configure and sanitize facilities.

Big Data Collaborations

Late last year, UCB formed a multiyear collaboration with Stanford Medicine to improve value for people living with severe disease through the development of solutions that combine clinical, digital, omics, and other data sets to identify which patients will respond best to certain treatments.

"The strategic application of AI and data science presents an opportunity to improve drug development and timely dosing, and uncover new applications for existing therapeutics," says Lloyd Minor, M.D., dean of the Stanford School of Medicine. "In this way, our collaboration with UCB advances Stanford Medicine's vision of precision health — a future where we will not only treat disease, but use new technologies to predict, prevent, and cure it precisely."

This is just one of the initiatives UCB has in place to take advantage of big data and analytics to guide its business strategy. Since the company invests a large percentage of its turnover in R&D, it has a huge amount of data to take advantage of when researching and testing drugs.

Technology advances are making it possible to extract siloed data and develop insights to treat disease. As a result, pharma companies are turning to tech innovators to solve problems such as optimizing drug discovery and design and speeding up data-rich R&D processes. In January 2021, Boehringer Ingelheim announced a collaboration with Google Quantum AI to develop cutting-edge use cases for quantum computing in R&D. The partnership brings together BI's expertise in computer-as-

sisted drug design and in silico modeling with Google's expertise as a developer of quantum computers and algorithms.

Big Data and Medicine Safety

Another area where big data is a priority is in pharmacovigilance and safety monitoring. However, mining data from databases and medical literature is very time-consuming, so companies have increasingly turned to digital processes to explore big data for potential patterns to detect adverse events that might get overlooked in traditional screening methods.

The current era of looking at different medicines to combat COVID-19 has led to the generation of large amounts of data, which requires a combination of big data analytics and artificial intelligence to gain better insights from both a usage and safety perspective. One area in particular that has become a huge focus is investment in big data for vaccine safety monitoring. The FDA is monitoring the safety of authorized COVID-19 vaccines through various safety surveillance systems and is collaborating with the Centers for Disease Control and Prevention as well as the Center for Medicare and Medicaid Services, the Department of Veterans Affairs, and other academic and large non-government organizations to

monitor healthcare data systems. FDA is also working with global organizations, including the WHO, on pharmacovigilance efforts. Authorities are conducting both passive surveillance — evaluation of unsolicited reports of adverse events in the Vaccine Adverse Event Reporting System (VAERS) — and active surveillance — analyzing information in large healthcare data systems to verify safety signals identified through passive surveillance or to detect additional safety signals.

As surveys show, big data and AI are set to become the biggest investment targets for pharmaceutical companies in the next two years as they look to advance R&D insights and improve business growth. ^{PV}

EXECUTIVE VIEWPOINTS



Lucas Glass

VP, Analytics Center of Excellence
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Decision Intelligence

As the technology to aid decision-making advances, we're able to take it a step further by introducing behavioral science, combined with a thoughtful application of AI and machine learning, to drive more intelligent decision-making. We anchor the technology to the decision-maker — learn how they interact with data to make decisions — then seamlessly integrate AI/ML in a manner that increases adoption and trust. This also enables organizations to demonstrate value from their investments in technology.

Using AI to Track Drug Discovery

Right now, we see a transformation in drug discovery, as AI and machine learning revolutionize the identification of promising new drugs — and repurposing of

existing ones — to optimize R&D pipelines. Using AI and machine learning in this way opens the door for nontraditional technology entrants into the life-sciences space to create new opportunities for impactful collaborations and, ultimately, bring drugs to market faster and advance human health.



Sudhir Ghuge

Associate Principal
ZS

Using Big Data to Inform Strategies Across the Spectrum

Big data offers numerous opportunities from using real-world patient data to identifying the unmet clinical need to powering programmatic clinical trials, using social determinants of health and consumer data to identify drivers of disparities of care, using myriad of datasets to devise a strategic customer engagement to influence and deliver better

patient care and patient experience. A comprehensive data strategy can build a complete 360-degree view of the customer, which is the foundation for driving data-driven decision-making successfully.



Manish Menon

Associate Principal
ZS

A Shared Sense of Understanding

Multiple data sources — both traditional and emerging — are easily available. There are evolving algorithms and the capability to effectively integrate data sets and recommendation engines elevate decision-makers from data-driven to knowledge-driven decision-making. Decision-making is not just faster but, more importantly, builds on the shared understanding within the organization and enhances it simultaneously.