



REIMAGINING LIFE SCIENCES WITH AI-ENABLED DIGITAL TRANSFORMATION

Abstract

Technological, regulatory and environmental changes, along with an increasingly active involvement of patients in their treatment process, have put tremendous pressure on stakeholders and transformed the Life Sciences industry. Artificial intelligence technologies like predictive modelling are giving researchers better tools to process large amounts of data, facilitating the identification of candidates for clinical trials and predicting the probability of success for potential candidate molecules. From regulatory compliance to the continuous monitoring of risk-benefit profiles of drugs, post-marketing and patient engagement efforts, AI technologies are helping Life Sciences companies stay relevant, create positive outcomes and effectively engage consumers.



Automation in Life Sciences

The Life Sciences industry is facing high cost and high demand for long-term care, driven by changing population dynamics, placing great pressure on the system. This is complicated further by the emerging paradigm of personalized medicine and value-based healthcare with a need for better patient outcomes for both episodic and long-term care. Pharmaceutical companies are transforming themselves to play a central role in driving outcomes by transitioning into value-based care models for their therapies, helping create a win-win situation for all stakeholders. Patients are likely to benefit the most as this will offer better access to care while keeping their insurance premiums in check. The transition to value-based care will drive personalized medicine as a core strategy for Life Sciences companies, helping them identify the right recipients for therapies.

Technology has a significant role to play in this fundamental shift, as value-based care and personalized medicine leverage cross-domain data from discovery to the marketing value chain. At the same time, it continues to produce new data that can further strengthen the foundation for creating evidence with growing scale. Pharma organizations need an industrial approach to automation, artificial intelligence (AI) and data science that can help reduce time-to-value at scale, and in a compliant environment.

The following discussion dives into business functions across the Life Sciences value chain where AI and automation can have a significant impact, from an industry and technology standpoint.



R&D

Pharmaceutical R&D is complicated by the failure of traditional blockbuster drug models where specific popular drugs generate immense annual sales and revenues. The industry that, until recently, worked in isolation targeting the commercial success of each drug, has been seriously affected, altering the macro and micro healthcare environment. In this new environment, novel approaches to leveraging real world commercial and scientific information at early stages of drug development can help evolve business strategies to maximize revenues with AI.

AI technologies can be used to optimize clinical trial design to better predict and monitor risks. Simulations driven by AI can help researchers understand the impact of key dynamics and plan for crucial scenarios, slashing response time and improving the overall quality of clinical trials.

AI and Data Analytics:

Together, AI (using supervised or unsupervised learning algorithms), predictive data analytics and machine learning, allow researchers to process enormous amounts of data and information. Predictive modelling of biological and environmental factors along with molecular and clinical data can help identify potential candidate molecules that have a high probability of becoming safe and effective drugs for target populations.

Robotic Process Automation (RPA):

Automation allows for more experiments to be performed within a given timeframe and minimizes the number of errors in clinical trial data

capture. Several processes, such as data entry into statistical databases, monitoring of protocol compliance, and data quality checks, can be automated for increased speed and accuracy. Automation and AI can be used to free up valuable time that researchers and scientists can then invest in high-value tasks that call for human ingenuity and creativity.



Regulations and Compliance

Pharmaceutical companies face increasingly complex regulatory requirements for the implementation of compliance programs to deal with local and international compliance challenges and privacy issues. In such a scenario, integrated compliance programs and technologies that can make data accessible for real-time data monitoring, audits and investigations are essential.

Artificial Intelligence

AI can be instrumental in helping monitor and process vast amounts of data from multiple sources. Cognitive technologies such as NLP (natural language processing) and image processing can be used to automate time-consuming manual tasks and improve data analysis, regulatory compliance and information security. These technologies can help enable the quality and compliance functions that allow monitoring of risks in real-time, identifying outliers and allocating resources efficiently.

Safety surveillance, regulatory information management, structured content generation, compliance monitoring, and continuous drug risk-benefit profile monitoring can be achieved with greatly reduced time and effort. Sharing of accurate and timely information with regulatory bodies plays a critical role in getting the drug to market faster.

The immense amount of information, combined with the number and complexity of the many regulatory tasks involving multiple sources of data and privacy issues, makes regulatory compliance a prime function that can exploit AI technologies. As the current regulatory framework

focuses on innovation and digital health technologies, both regulatory professionals and organizational stakeholders can reap benefits through openness to innovation, thereby enhancing compliance and productivity.

Patient Engagement

Pharmaceutical companies investing in a relationship with patients during drug development and post-marketing can aid in better outcomes including greater patient retention and focused clinical trials, aiding companies to make the shift to value-based care. By providing patients with better tools and focused information regarding drugs, treatments and methods to manage their conditions, drug makers can reduce potentially dangerous errors related to drug usage and minimize the time and effort patients have to expend in navigating the healthcare system.

Sensor-Enabled Devices and Analytics

As smartphones and wearables evolve with the capability to communicate wirelessly with medical software (providing remote monitoring capabilities), more patient information is becoming available to Pharmaceutical companies, facilitating R&D and enhanced treatment efficacy. This can have a significant impact in providing quality healthcare and lowering overall costs. The technology can help drive behaviour modification - by getting the individual actively involved in the identification, prevention and treatment of conditions - which can have far-reaching results.

Machine Learning and Predictive Analytics

Machine learning and predictive analytics can be used to identify the right candidates for clinical

research by analyzing a wide range of data including visits to physicians, social media interactions and even population-specific information. This can help implement more targeted and efficient trials which can lead to better adherence. Treatments leveraging personalized medicine can be devised by physicians with the help of supervised learning (AI) capabilities which can help them draw conclusions from a limited set of diagnoses and individual health data. Pharma companies can also leverage insights generated by AI from patient interactions and dialogues to enable co-creation, innovation and the development of patient-relevant products and services.





Marketing

Today's consumers are digitally connected and exposed to overwhelming amounts of data. They are actively involved in their healthcare decisions, keenly seeking information about available drugs, therapies and even medical devices. Audiences are eagerly engaged in finding relevant information through online research, word-of-mouth, social media interactions, and so on. However, it is often the case that the necessary information is not easily available. This can dissuade consumers from using a drug and that can go on to affect their treatment outcome. This, in turn, affects pharma companies adversely. How can companies give consumers information that's relevant to them, at the right time and right place?

Automation and Data Analytics Tools

Personalized marketing initiatives based on online behaviour such as purchasing activity, amount of time spent and nature of interactions on websites, social media, apps etc., can be created using AI. It can provide predictions about ideal marketing messages, media, frequencies, and so on. Machine learning and NLP have been successfully leveraged to identify individual affinities and interactions on social media to deliver targeted marketing messages to entice and engage the right audience. Social media can also be leveraged to increase transparency and positively impact patient behaviour.

Marketers across industries are increasingly focusing on customer experience and satisfaction as the key competitive differentiators. A seamless customer experience, with companies making access to relevant information easy, timely and intuitive, is essential for positive outcomes and effective consumer engagement. NLP, computational linguistics and analysis of biometric data can offer insights into the lives of customers. This can help analyze sentiments behind reviews, comments, ratings and other forms of online expression.



Automation and Integration – Take Advantage of the Emerging Paradigm

As pharmaceutical companies move away from traditional, top-down product promotion models towards a more flexible and interactive approach that allows patients to be better engaged, AI and automation technologies can be effectively leveraged to take advantage of the transformation. With organizations moving towards personalized value-based models, rigid data silos will be replaced by data that flows easily between functions, integrating it from all stages of the value chain - from discovery and clinical development to real-world use and collaborations with external partners like physicians or CROs. This can bring essential real-time and predictive analytics capabilities that generate business value and facilitate the shift towards personalized value-based healthcare.

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