Navigating the Path From Advanced Analytics to Artificial Intelligence

By Arun Shastri and Sagar Madgi

Pharmaceutical companies have a long history of making data-driven decisions and growing their business with innovative analytics and technology. They've been on the leading edge of leveraging new algorithms to design territories, using optimization techniques to design call plans, and applying increasingly sophisticated analytical approaches to determine customer segmentation.

Pharma commercial organizations' analytical quotient has steadily increased over the years, with the application of newer methodologies, the ability to analyze larger volumes of data and to integrate multiple data sources, and the ever-improving ability to make data-driven decisions. They've also developed increasingly sophisticated and data-driven business planning processes, which have spawned organizational changes in the form of new departments such as commercial operations, marketing analytics and insights, and brand analytics.

The pharma industry has progressed relatively speedily along the analytics maturity curve, but the analytics landscape is undergoing another massive shift—and this time it's different. What worked in the past will not easily translate to success in this new realm. Why? The data, infrastructure, operating model and more require a different approach and mindset.

The Transformative and Disruptive Potential of AI

While healthcare might lag other industries in the use of artificial intelligence today, its rate of AI adoption is increasing, driven predominantly by innovation in clinical research, robotic personal assistants and big data analytics. Players across the healthcare ecosystem are already utilizing AI in a significant way for R&D, marketing, supply chain and clinical decision support, and AI pilots reportedly are beginning to pay dividends. In care delivery, AI is being used or investigated for a range of purposes including the detection of disease, the management of chronic conditions, care delivery in provider settings and the automation of administrative tasks, to name a few.

However, in the pharmaceutical industry, many companies are still working hard to figure out where and how to integrate AI and machine learning into their business. They're stymied by a lack of clarity around AI's potential applications within a pharma organization, how organizational structures need to adapt to allow for AI's integration, how to handle the inherent and often immense technological challenges that AI presents, and simply how to begin.

AI has the potential to truly automate, augment and disrupt human activity across sales, marketing and R&D. By leveraging utilization and real-time diagnostics data in addition to medical claims and prescriptions, brand teams can allocate promotional resources more effectively, and conduct targeted and timely physician outreach isolating when the physician has a relevant patient and is exploring treatment options before a patient needs therapy. In R&D, AI can be of immense value in all phases of drug development and trial execution—for example, in identifying patients for trials using advanced analytics, or enabling protocol optimization and simulation, site selection, and forecasting demand. Introducing AI into both clinical trials and manufacturing could supplement human workflows, potentially reducing the time and, by extension, the cost of further treatments.

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However, AI also has the potential to upend pharma's existing business and commercial models. For instance, AI can be used to review established treatment alternatives and recommend the most appropriate combination of drugs for a patient in a disease state, based off of consensus algorithms from experts in the field. What does that mean for pharma? Marketing strategies that have been traditionally HCP-focused would then need to find newer pathways to customers, accounting for these "algorithms" and potentially disrupting pharma's existing organizational structure.

Assessing the Challenge at Hand

Regardless of pharma companies' historically proven facility with data and analytics, the pharma industry has been slower to adopt AI because it demands a different approach than the advanced analytics use cases that pharma companies have spent many years perfecting. In general, analytics and technology should be built into an organization as the foundation underpinning business processes rather than as an addition, but integrating AI into an organization is even more complex. For AI to realize its potential to power business and commercial models, the pharma organization has to be wired for it.

DATA

The scale of the input data that's necessary to fuel artificial intelligence could be much larger and more diverse than for advanced analytics, accommodating for AI use cases such as NLP and involving hundreds of variables, many of which are rapidly changing. Pharma companies might need to spend additional time on creating relevant problem features. And companies will need the ability to process large volumes of rapidly changing data from a diverse set of structured (patient-level data, sales, etc.) and unstructured (text, images, videos, voice, etc.) data sources.

AI systems mature over time as they are fed more data and can work well with imperfect data as long as it's free of systematic bias. In fact, one of the biggest advantages of artificial intelligence over traditional analytics is that it can be used to improve the quality of the data. That said, a company's data procurement strategy is important to get right. Many companies' data procurement strategies are still reactive, which means that they can't start working on impactful AI-fueled projects because they don't have the right data on hand. Companies need to think ahead about what data is critical to solve a problem and go about acquiring it, keeping in mind that negotiating data contracts with vendors can be time-consuming.

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OPERATING MODEL

To prime themselves for AI, pharma organizations need to adopt a nimbler and more interactive approach within their operating model than they needed with the earlier waves of digital adoption—think, "fail fast and learn faster." They need to be able to experiment with an AI application, measure its impact, adapt and continually refine it in short time cycles.

This, in turn, requires pharma companies to change their relationships with regulators, providers and payers, and to incorporate stakeholders' objectives into their operating model early on.

The very nature of applying new methods to various use cases has distinctively made AI-related transformation into a team sport. To maximize the value of AI solutions, companies need to tap the expertise and skills from the domains of business, technology and data sciences. This requires a new way of working that's more collaborative and brings together diverse skills sets from different organizational functions. The team-based approach also will have to grow to include engaging the regulators, providers, payers and other stakeholders while developing AI solutions.

INFRASTRUCTURE

AI is a different set of technologies and requires a different mindset than the traditional database and transaction-based approach. Organizations will need an "agile," open, cloud-based environment with access to advanced AI tools.

AI's benefits are truly realized at scale, and scaling typically involves integration with existing systems and processes. This necessitates a wide range of tech considerations such as data standards (with all kinds of data sources) and the auto-scaling of data storage based on demand, computing power, etc.

In order to bring AI applications to scale, an organization needs data engineers to procure and assemble the data sets, data scientists to discover the algorithms that work best, and machine learning engineers to guide the implementation. The needs of each of these roles are quite varied and the organization needs to ensure that the infrastructure can support all of them.

ASSETS

Artificial intelligence and machine learning solutions have building blocks that are potentially useful in solving other related yet different problems. For example, feature engineering approaches or the natural language processing ability developed for commercial also can be leveraged in research and development solutions, so such solutions need to be conceptualized and developed as assets and services that can be leveraged across functions such as R&D, commercial and supply chain, rather than as point solutions.

In addition, companies should consider learning transfer in developing solutions. For instance, machine learning solutions aimed at figuring out adherence levers in the general patient population can be repurposed to figure out how

to reduce drop-outs and increase adherence in clinical trials. And algorithms built for predicting patient events can be used to identify the right set of patients for clinical trials or can aid in precision marketing.

MODEL LIFE-CYCLE MANAGEMENT

AI solutions that are algorithmic and data-driven are fundamentally derived from underlying patterns in data. As such, changes in patterns of data without concomitant changes to algorithmic models might result in suboptimal solutions. A regular cadence of model management and monitoring needs to be maintained to ensure that the model stays relevant.

MODEL "EXPLAINABILITY" AND TRANSPARENCY

A key consideration in approaching AI compared with advanced analytics is that a lack of transparency or "explainability" might affect the adoption of AI-driven solutions across both commercial and R&D functions. In commercial, end users of an AI-driven solution might need to be given the rationale for using the suggestions or recommendations developed by algorithms, since the logic might not be clear. Where did the suggestion come from, and how can I trust that it's accurate or relevant? Commercial teams could need to understand the logic, the "actionability" of recommendations, etc., before they trust AI-powered suggestions, so making AI "explainable" will be crucial to get end users on board.

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In R&D, where the regulatory environment is even more stringent, artificial intelligence and machine learning implementation can become particularly challenging due to the potential black-box nature of certain algorithms. As AI solutions in R&D may end up impacting the general population in certain instances, it also will be crucial for the broader healthcare ecosystem—including regulators, payers, providers and patients—to be able to see inside the black box and understand the causal reasoning behind machine conclusions. Getting the AI or ML algorithm "certified" by the right stakeholder will be crucial for driving adoption.

Four Key Components for Making the Transition to AI

Surveys indicate that roughly half of healthcare organizations believe that the healthcare industry will see broader AI adoption over the next five years. To make the transition to AI, pharma organizations will need to develop newer and distinct capabilities in three key areas:

+ **Data strategy:** A critical ingredient for driving AI adoption across business and functional groups is well-organized, well-defined data, accessible across the enterprise and by all partners.

+ **Technology capability:** Realizing the full value of AI solutions requires the flexibility to interface with legacy systems while also allowing for the implementation of advanced solutions.

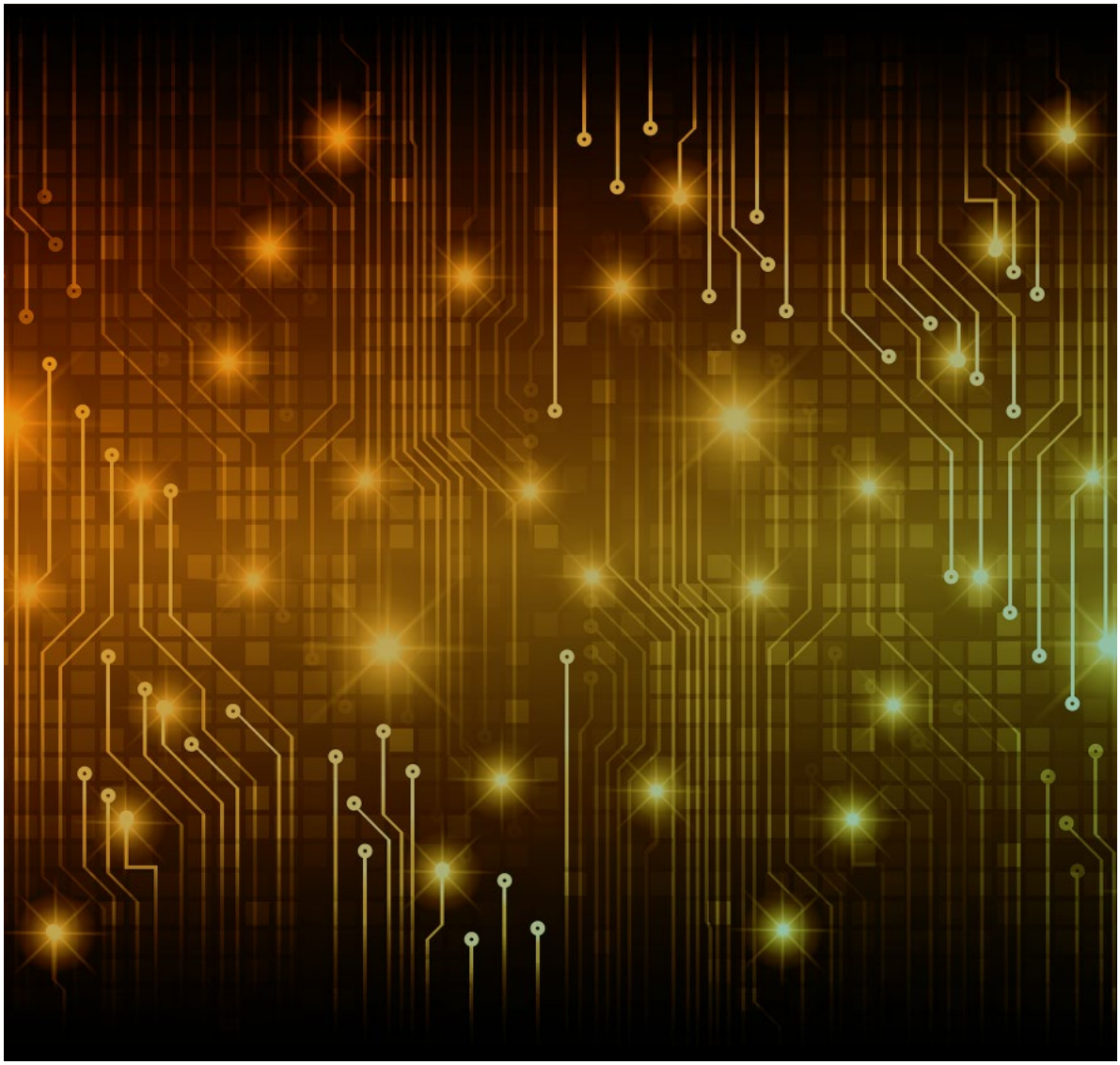
+ **People:** It's important to note that new roles with specific skill sets are emerging in this new world, such as data scientists, data engineers, machine learning engineers and more. It takes a village to build and deploy these models. Another important people-related aspect is that a company's management team (or, at the very least, the analytics organization) must understand what AI is capable of and have a shared vision for how it can benefit their organization, so education is a critical function.

+ **Change management:** Given AI's impact on traditional business models, which may possibly seem disruptive in some instances, it will be important for pharma companies to develop a strong change management capability to drive successful adoption. They have to be prepared to manage unrealistic expectations around what AI can and can't do; to identify the main "attitudinal" barriers to adoption such as a fear of change and

the perceived loss of control because of AI-led automation, since AI is more likely to augment people's skills rather than replace them; and to identify their organizations' skill barriers in implementing and working with AI, and to develop programs to close the gap.

While the pharma industry has extensive experience with data and analytics, AI is a different animal altogether in terms of its transformative and even disruptive potential across pharma's functional areas, and the discontinuity that it may entail during its adoption. But pharma companies have to find a way to more fully embrace AI now. Even in its early stages within the pharma industry, AI is having a real impact on the business and likely will be a competitive differentiator for pharma companies.

The healthcare ecosystem is rapidly moving towards integrated treatment innovation, and AI offers an opportunity for pharmaceutical companies to take the lead in changing the course, positioning themselves as innovators rather than simply product suppliers.



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