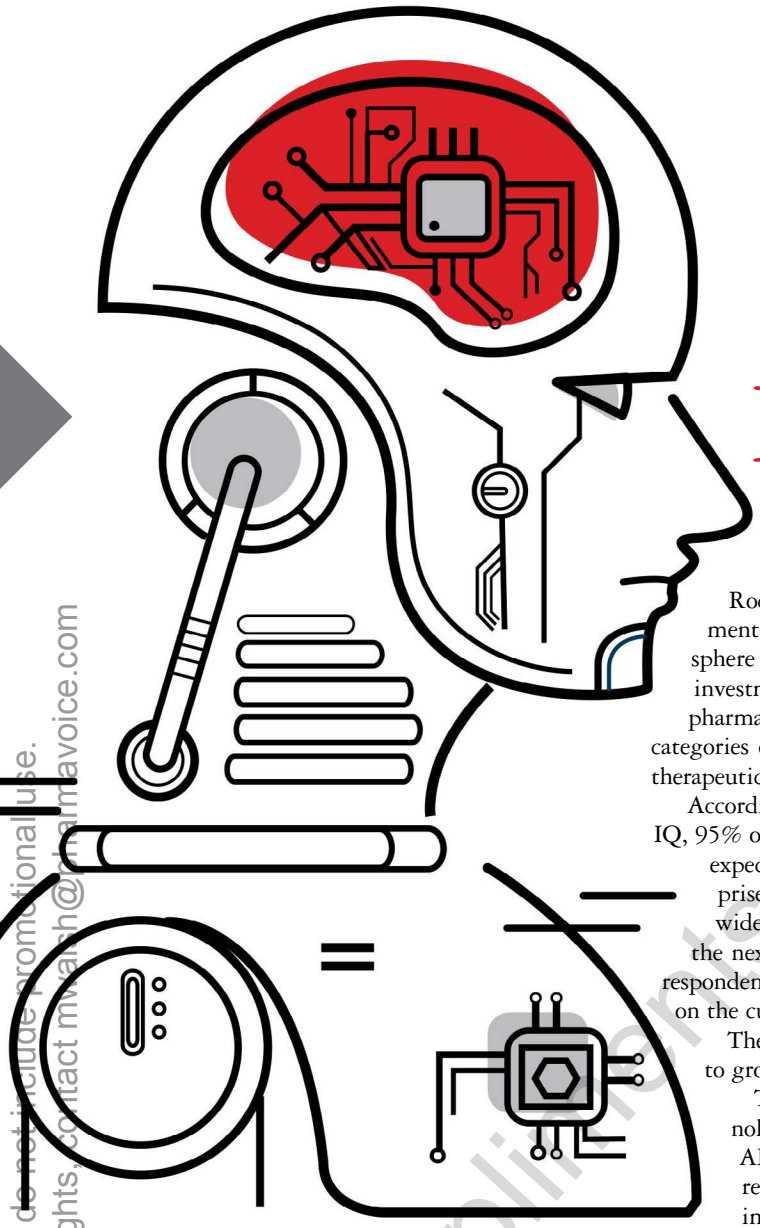
by Robin Robinson

The Uptick in AI Use Will Bring Pharma Into the Future Faster



Reports projecting where the industry would be in terms of artificial intelligence (AI) in 2020 predicted that AI and machine learning were set to transform the pharmaceutical industry … in the near future. Rock Health has monitored investments within the digital health ecosphere since 2011, and it reports that investments have started to shift into the pharmaceutical arena, mostly within the categories of R&D, clinical trials, and digital therapeutics, which includes using AI.

According to a 2017 report by Pharma IQ, 95% of the pharma professionals surveyed expected the impact of intelligent enterprise technologies to take hold in the wider drug development industry over the next three years, with one-fifth of the respondents believing that the industry was on the cusp of a revolution.

The cusp is here now and will continue to grow into 2020.

Toronto-based biomedical AI technology company BenchSci, which uses AI to help scientists plan and select reagents for more successful experiments, lists 33 pharma companies on its website that are using AI to enhance drug discovery to date.

Novartis has partnered with the likes of MIT, IBM Watson, Quantumblack, and Intel to enhance its AI goals. Recently, Novartis and Microsoft joined forces to apply AI to some of the most intractable problems in healthcare, in one of the most expansive tie-ups so far between big pharma and big tech. Under one part of the five-year agreement, Microsoft will work on new tools intended to make it easier to apply AI to all areas of the company's business, from finance to manufacturing. A second part of the work will focus on using deep learning to improve the speed and precision with which it develops new medicines. This appears to put Novartis in the lead in leveraging AI in pharma use cases, with investments ranging from drug trials to drug discovery to patient analytics projects.

Lilly is supporting its AI drug discovery efforts through a partnership with Atomwise to develop up to 10 drug targets. Merck, AbbVie, and Pfizer also partner with Atomwise. GSK has been partnering with AI-based drug designer Insilico Medicine since 2017 and has collaborations with Exscientia, BERG, and Cloud Pharmaceuticals, as well.

Roche has partnered with Owkin, Syapse, and GNS Healthcare, and has acquired its own healthcare technology company, Flatiron.

These examples make it clear an AI revolution is on its way in pharma.

Back in 2015, Nature reported that about 80% of life scientists use antibodies, spending

THE TOP 10 PHARMA COMPANIES HAVE ALL COLLABORATED WITH OR ACQUIRED AI TECHNOLOGIES: NOVARTIS, ROCHE, PFIZER, MERCK, ASTRAZENECA, GSK, SANOFI, ABBVIE, BRISTOL-MYERS SQUIBB, AND JOHNSON & JOHNSON.

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RITESH PATEL
Ogilvy Consulting

$3 billion per year on more than 6 million products. However, only half of commercially available antibodies are reliable, and finding them is a challenge. AI addresses this challenge, as it can organize, interpret, and map relevant data, and present results dramatically faster than traditional means of discovery.

Ritesh Patel, chief digital officer – health, Ogilvy, tells us that companies like Atomwise, Owkin, and Insilico are revolutionizing the R&D process by using AI and machine learning, at scale, globally.

"Digital therapeutics is no longer seen simply as a beyond-the-pill service," he says. "Instead, it is gaining strength as a standalone product, as are partnerships or outright acquisitions of consumer-oriented technologies now bolstering a nascent area for the pharma industry."

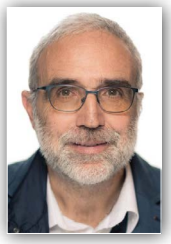
In another example, Lilly is using Microsoft 365 to improve its cross function and collaboration channels throughout the organization by using AI capabilities within those applications. This helps to bring together scientists across hundreds of locations and organizations and empower the workforce to enable better communication. Lilly's goal for using the platform is to dissolve physical barriers so that scientists in one lab can share a concept with scientists across the globe or within the same building, seamlessly. Microsoft also works with Merck and Allergan.

The potential for AI-driven innovation is especially significant and will enable better decision-making across organizations, amplify the tools and processes organizations already use, and tear down knowledge barriers so every employee can engage and become empowered to reach their full potential, says Dave Meyers, national director U.S., life sciences, Microsoft.

"AI will unlock transformation that goes broader than operational efficiency, or point solutions, or individual breakthroughs," he says. "AI has the ability to fundamentally transform the pace and scale of discovery and the delivery of care."

Mr. Meyers cites examples of AI in use in the industry today:

What Experts Are Saying About the Potential of AI in 2020 and Beyond



DR. MARCO ANELLI
Principal Consultants Coordinator; Head of Data, Information, Knowledge & Intelligence Group, ProductLife Group

I regard artificial intelligence as a tool for decision making not a decision maker. Today, AI-based systems are being used to collect, collate, distil, and classify information and add value, then hand that information to subject matter experts who will decide what is relevant and what actions need to be taken.

AI has enormous capabilities. It can make predictions in many situations and provide statistical data based on a high degree of probability. But, at the moment at least, it can't replace human intuition. I don't know that we will ever be able to reproduce intuition because good leaders don't make decisions solely based on numbers or data.

There are also regulatory and legal implications. For example, a few years ago there was a stock market crash that originated from automated selling of stock when it reached a certain price. That forced authorities to regulate automated selling.

Possible damages caused by AI also create legal problems. For example, if a smart car crashes and kills someone, who is responsible: the driver, the manufacturer, or the programmer?

I think AI will become an even more important tool in the decision-making process for companies, but I don't see it substituting the decision-making capabilities of people with experience in the field.

TIMOTHY HARE
VP, Head of Data Science, 81qd, @81qd

From R&D through commercialization, AI-driven decision-making results in better preclinical decisions that are safer, include more effective clinical trial drug candidates, reduce the escalating and unsustainable costs of bringing new drugs to market, and enable drug development in therapeutic areas that have been refractory to traditional rational drug design (RDD) approaches.

Analytics provides actual insights and strategies, not just data. AI platforms offer high-value, cost-effective solutions that maximize the commercial potential of therapeutic innovation by revealing patterns, trends, and associations, especially those relating to human behavior and interactions. Big analytics that leverage machine learning can take a range of claims data and be used to change how we approach our two core groups — patients and physicians — in a more nuanced and impactful way.

PAT HUGHES
Chief Commercial Officer, CluePoints

We are already seeing great strides in machine learning and deep learning techniques being applied to the area of risk-based monitoring. Based on results from hundreds of trials, it is becoming possible for the software, without any human innervation, to suggest the corrective action that will likely result in a successful outcome. Risk-based data management has huge potential for both cost and resource efficiencies in reducing the number of manual queries that a sponsor has to deal with. We are only scratching the surface about how these techniques are going to revolutionize the industry and the potential savings are huge.

REBECCA KUSH, PH.D.
Chief Scientific Officer, Elligo Health Research

AI is not yet a panacea to solve decision-making concerns from R&D to commercialization. The power and value of AI is closely linked to the quality of the underlying data upon which it is based, along with the amount of that data that is available. Clinical research studies, especially pre-approval studies, typically collect precious data from patients, meaning that there is insufficient data upon which AI-based decisions can be made or upon which to train the AI algorithms.

There are areas in the overall development process where AI can have a positive impact. These may include larger studies, safety or post-marketing, or feasibility studies based upon real-world data. Unfortunately, the current quality of most real-world data is also not yet sufficient to enable AI to be the only basis for decision-making; RWD is typically used to augment pivotal trial data, not to replace it. Thus, until the quality of RWD improves, we have a ways to go as an industry to get to full adoption from R&D to commercialization.

- AI and vision computing are augmenting evaluation of tumors and assisting with radiation planning.
- Machine learning algorithms are monitoring and facilitating active surveillance of prostate cancer.
- AI in genomics and other-omics are being used broadly across research, diagnostics, studies, and treatments.
- Natural language processing and machine learning are reading hundreds of thousands of research reports and clinical trials to identify new targets.
- AI is simulating the pathways of the neuron to replicate the effects and interactions within the neuron in neurodegenerative diseases.
- Augmented reality and AI are being used to visualize molecules, simulations, DNA, provide guides, disease progression, and other digital experiences.
- Social listening, sentiment analysis, and natural language processing services are being used in pharmacovigilance, customer analysis, and sales and marketing optimization.
- Sensors, streaming data, and machine learning are assisting with predictive maintenance in manufacturing.
- IoT, sensors, and AI are being employed for supply chain optimization, cold chain tracking, and supply chain compliance.

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DAVE MEYERS
Microsoft

Mr. Meyers says these use cases only scratch the surface of what AI can bring to the industry. "Ultimately, we believe humans and machines will work together to solve society's greatest challenges," he says.

What Experts Are Saying About the Potential of AI in 2020 and Beyond

MARIO NACINOVICH
Global Head, Communications and Marketing, AiCure

At its core, AI affords tremendous potential to propel an individual organization, country, business sector — some with earlier and more rapid adoption than others — and, if we are truly harnessing this innovation, our overall global economy. Few technologies in this era can hint at, let alone quite literally have, such an economic impact.

While among the slowest sectors to adopt AI, the pharmaceutical industry is beginning to truly understand, and is continuing to embrace, both the gains in efficiency and the greater promise of the economic impact of this innovation. For example, advances in AI combined with remote digital capture of patient data now allow for previously unattainable visibility into patient dosing behavior within clinical trials. These real-time insights, based on new dimensions of real-time data, increase confidence in the data quality and integrity necessary to drive efficient decision-making at the subject, study, and portfolio levels within pharmaceutical companies.

VIMAL NARAYANAN
Founder and CEO, MedTrix Healthcare
vimal@medtrixhealthcare.com

Companies are currently focused on the side of the drug development and data analytics using the power of AI. A recent partnership was announced between Novartis and Microsoft on creating an AI Innovation Hub that would bring AI to everybody's desk. This includes manufacturing and commercial activities as well. What this means for the shift from pilot to full adoption is that in a few years, no tool used in a pharma company shall be without a component of AI. There are several pilot engagement programs that have been initiated in external stakeholder engagement like never before. These include patient engagement and disease management, HCP engagement and education, training of sales reps and MSLs, etc., and all of them have the potential to become multi-billion dollar programs in the next three to five years and offer companies working in this space a huge opportunity and fillip. The next step for AI in pharma is to move from data to content and fulfillment.

YILIAN YUAN
Senior VP, Data Science and Advanced Analytics, IQVIA

Whether pre- or post-approval, artificial intelligence and machine learning are transforming the pharma industry by helping to improve efficiencies, profits, and patient outcomes. We are already seeing the enormous benefit that AI can bring to clinical development in significant time and cost efficiencies. AI can accelerate site recruitment by 40% and patient recruitment by 30%. AI and machine learning are changing how pharmaceutical companies plan and execute the launch of new products to market.

In the prelaunch phase, there is no market data to tell us how a product will perform, but using machine learning models makes it possible to predict a doctor's future potential in the market by leveraging their prescribing behavior across all diseases and patient mixes. Machine learning models have superior capabilities to handle the complexity of a vast volume of data and, by analyzing this data, it is possible to predict a doctor's potential over a six- to 12-month time period with a high degree of accuracy. This allows drug makers to optimize their promotional efforts and better target doctors during the launch period.

From a launch sales plan perspective, using machine-learning models makes it possible to segment physicians and patient clusters within their practices. Knowing which physician segments to engage as a priority during the launch phase allows manufacturers to optimize sales plans.

Following the launch phase, machine-learning models can also help accurately measure the results of promotional campaigns and the differentiated impact of multi-channel strategies on product performance. This allows product managers to do any necessary course correction during the launch window. PV

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