

By Robin Robinson

HEALTH TECHNOLOGY: The Merging Disciplines of MEDICINE AND INNOVATION

The World Health Organization defines health technology as the “application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of lives.”

From drug development to standardizing EHRs, from scheduling rides to clinical trials to trial site feasibility, pharmaceutical and technology companies are teaming up to create solutions that address some of the industry’s most pressing issues. Such partnerships hold great promise in shaping more efficient and

streamlined processes across the entire spectrum of the life-sciences business. But the two entities function very differently, and there must be concerted efforts between partners to understand the nature of each other’s business.

“Partnerships between pharmaceutical and tech companies have the potential to be truly groundbreaking — when the scale and expertise of one is combined with the nimbleness and creativity of the other, we can have consequential impact,” says Marta Bralic Kerns, VP, business development, at Flatiron Health.

Flatiron Health is a healthcare technology and services company that focuses on accelerating cancer research through its platform to enable cancer researchers and care providers to learn from the experience of every patient. Currently, Flatiron partners with more than 280 community cancer clinics, seven major academic research centers, and more than 15 of the top therapeutic oncology companies. Roche acquired Flatiron Health in 2018 after previous funding rounds from Google Ventures, First Round,

The colliding worlds of healthcare and technology are creating new opportunities address unmet medical needs.

and others. The acquisition brought together two companies that had independently been committed to improving the lives of cancer patients through the evolving field of healthcare data and analytics.

Roche uses Flatiron’s real-world datasets to advance the use of real-world evidence to set new industry standards for oncology research and development. Under their operating model, Flatiron Health continues to operate as a separate legal entity.

“While partnerships can indeed prove very fruitful, we often find that navigating large pharma organizations can be challenging,” Ms. Bralic Kerns says. “To help smooth the way for such partnerships it is important to have a senior champion who understands the vision of the partnership and who can help get the right stakeholders together to accomplish the objectives.”

The biggest challenge is to articulate the value of technology and that derives from data, and for novel technologies, proving value could take some time.

ADAM HANINA
AiCure



Finding Common Ground Among Differing Cultures

As with any partnership, it's important to build off the commonalities of disparate cultures while recognizing and respecting differences in execution and know-how.

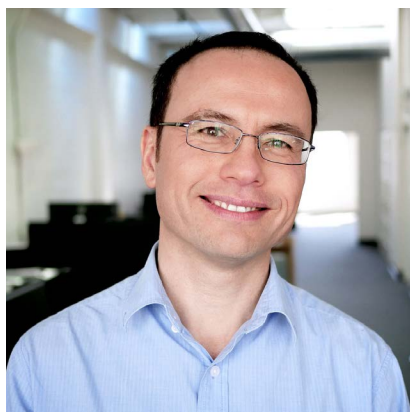
Gregg Talbert, global head of digital and personalized healthcare, Roche Pharma Partnering, says when it comes to partnering with a technology company, it's important to recognize that tech companies operate in a faster-paced, less regulated environment — with shorter innovation cycles — than the pharmaceutical industry. Therefore, it is important for both parties to understand and appreciate the differences in the core businesses, processes, and decision-making leading to certain deal parameters. “For instance, while intellectual property is as crucial for tech companies as it is for biopharma companies, the ability for tech companies to produce faster iterations of a core technology often makes them more open about sharing certain information,” Mr. Talbert says. “On the other hand, pharma companies are working with much longer innovation cycles and, therefore, rely heavily on strengthening the IP protection of their innovations. This can eventually lead to fundamentally different views on how to handle data and IP rights.”

Bert Hartog, Ph.D., senior director, Janssen Clinical Innovation, agrees it's important to recognize the differences between the two industries to achieve successful partnerships.

“Starting with the benefits, typically tech companies have shorter development cycles, they can build prototypes of solutions very quickly, and they can adapt and build out solutions for use at scale,” Dr. Hartog says. “Also, tech companies tend to have a diverse array of clients from different industries, where they can take the learnings from one partner to benefit another partner.”

On the flip-side, pharma companies have very specific legal and regulatory requirements in the commercial setting and even more so in the R&D setting for clinical trials, which are often poorly understood by tech companies. Compliance and sometimes specific, unique additional local requirements can hinder the advantage of short development cycles that tech companies are used to, he continues. Furthermore, working with doctors and sick patients often has different demands than, for example, general consumer devices and tech solutions. “For instance, patients with serious disease have other worries than finding out how to connect or charge their actigraphy device to measure activity levels while trying to manage their life,” he says.

Anne Heatherington, Ph.D., head, Data Sciences Institute, Takeda Pharmaceutical,



Technology allows researchers to pursue a target for a disease that they wouldn't have otherwise been able to pursue.

DR. HAN LIM
Atomwise

agrees that operating in a regulated environment can be a challenge for some technology companies. “Everything we do in clinical trials, for example, is guided by processes designed to protect patients and their privacy and ensure the integrity of the resultant data,” she says. “To a tech company, we may appear to be slow and cumbersome. But the way we work is a consequence of our regulated reality, which may be unfamiliar to a tech company.”

In terms of tech know-how, the two types of businesses are built on very different models. While each is very complex, the technical knowledge needed to successfully operate in IT is completely different from the expertise that is needed to work in biotech/pharma.

“Successful partnerships therefore depend on each company becoming knowledgeable enough about the other's domain to communicate effectively, understand the other partner's challenges, and understand how each party can benefit from each other's expertise and capabilities in the best possible way,” Mr. Talbert says.

It takes real collaboration between the teams at both companies over a period of time to learn how to adapt to new technologies and apply them to maximize impact. This could mean a pharma company working closely with a data company to identify appropriate use cases and research approaches for a dataset, or figuring out how to build new, specialized capabilities for analyzing new data types.

“In our experience, this upfront investment by both parties pays off — once we have the right team in place — one that understands the nuances and potential applications of



The convergence of technology and biotechnology is poised to disrupt modern medicine by using genomics and new technologies, such as gene therapy and gene editing, to turn medicine on its head.

CHAD ROBINS
Adaptive Biotechnologies

real-world datasets. The possibilities are endless,” Ms. Bralic Kerns says.

Despite some of the obstacles, Dr. Heatherington says partnerships between pharmaceutical and tech companies have enormous potential to translate science into meaningful innovation for patients. “Finding the common intersection and working through the process can sometimes be challenging,” she says. “A compounding issue here is that both pharma and tech have their own vocabulary and jargon, making communication and alignment difficult initially.”

Takeda is currently evaluating a number of digital sensors for potential use in clinical trials, and Dr. Heatherington says she is excited by the opportunities in the ecosystem. She says when evaluating a potential partner, Takeda ask questions related to the attributes of the device itself: How robust is it? How has it previously been used? Is it patient friendly? How are data transmitted? What type of analytics will be needed on the data?

“Experience and the culture of the company itself are also very important to evaluate,”

she says. “Experience working in a regulated environment, the ability to reliably supply devices for a pilot study or beyond, and a willingness to collaborate on understanding a specific use case for a device are all attributes of an attractive partner. Alignment with our patient-centric culture is also a must.”

Han Lim, Ph.D., VP, global head of part-

nering at Atomwise, has witnessed a move by pharma companies to be more openly supportive of partnerships with technology companies.

“The pharmaceutical industry is embracing the need to move forward quickly,” Dr. Lim says. “We’ve reached the point where not only is it recognized that we need to speed

up drug discovery, but the industry has recognized that the traditional tools just don’t work for the types of challenges that it is now facing.”

For example, companies want to screen billions of compounds and in the past that was a very slow and very expensive process using traditional tools. But today, billions of com-

Pharma-Tech Partnerships Driving Innovation

ADAPTIVE BIOTECHNOLOGIES AND MICROSOFT

Adaptive Biotechnologies is leveraging Microsoft’s Azure technology to decode the adaptive immune system, one of the largest clinical applications of genomics. There are more than 100 million genes in a human adaptive immune system compared with 30 thousand genes humans are born with. Adaptive Biotechnologies built a platform to read and translate the massive genetic information of the adaptive immune system to develop diagnostics and therapeutics that have the potential to be truly personalized and patient specific.

“We realized we needed serious computing power to do this with the scale, precision, and speed necessary to develop a pipeline of diagnostics and therapeutics that have the ability to meet regulatory standards and can get to patients quickly,” says Chad Robins, CEO and co-founder of Adaptive Biotechnologies. “We partnered with Microsoft to help us rapidly identify clinical signals. This is the basis for a diagnostic product we are developing, immunoSEQ Dx, which may enable early detection of many diseases from a single blood test.”

Signals of disease, or antigens, can be identified in the blood by the adaptive immune system long before symptoms of disease manifest. Adaptive is applying Microsoft Healthcare’s machine learning to enhance their ability to map millions of immune cell receptors to thousands of disease-related antigens to enable more rapid detection of numerous diseases, including Lyme disease or multiple sclerosis. Conditions can be identified before people begin to feel ill, and with earlier intervention, the potentially

devastating effects of such diseases can be prevented.

“We’ve been very fortunate in our partnership with Microsoft to develop the TCR-Antigen Map,” Mr. Robins says. “Using Microsoft machine learning and AI capabilities, we can map the immune system to create personalized diagnostics to enable early detection of many diseases, including cancer, autoimmune diseases, and infectious diseases.

Andrea McGonigle, national managing director, health and life sciences industry at Microsoft, says technology, specifically AI, can help speed the time to market. “We are entering a new wave of digital innovation and technology infusion into every facet of business,” Ms. McGonigle says. “With a culture of innovation, discovery, and research, pharma and life-sciences companies are well-positioned to lead the way with integrated AI and data science, providing a strategic foundation for current and future initiatives, and enabling the race to delivery of precision medicine.”

Mr. Robins says the two biggest challenges faced by the partnership were creating the right environment for a cohesive team and establishing a way to easily share massive amounts of data between companies. “Early on in the partnership, we recognized that our teams needed to be seamless, going beyond basic collaboration,” he says. “Very quickly we established a shared workspace at Adaptive Biotechnologies where Microsoft team members can sit side by side with the rest of the TCR-Antigen Map team. By working together, from planning to execution, as an integrated team, we were able to easily address other hurdles, like sharing massive amounts of data between the two companies.”

ATOMWISE AND DRUGS FOR NEGLECTED DISEASES

Atomwise, a biotech company using artificial intelligence for drug discovery, is partnering with the Drugs for Neglected Diseases initiative (DNDi), a nonprofit research and development organization working to deliver new treatments for neglected diseases, such as Chagas disease. The research collaboration is part of Atomwise’s Artificial Intelligence Molecular Screen (AIMS) Awards program.

Through the AIMS program, which supports hundreds of researchers at nonprofit institutions and universities worldwide, Atomwise provided compounds at no cost to be tested by DNDi researchers.

“We have had a very positive experience in our partnerships,” says Han Lim, Ph.D., VP, global head of partnering, Atomwise.

Atomwise’s partnership with DNDi is exciting because it tackles challenging targets, Dr. Lim says.

“We embrace challenges that are considered tough, including protein-protein interactions,” Dr. Lim says. “Researchers have been able to pursue a target for a disease that they wouldn’t have otherwise been able to pursue. We are lowering the barriers to drug discovery. AI technology is efficient and shortens the time scale. We can now help researchers pursue exciting, novel strategies for drug discovery.”

BIORASI AND WATSON HEALTH

Biorasi, a CRO that develops complex clinical trials to help pharmaceutical and biotechnology companies accelerate the process of bringing safe and efficacious therapies to market, needed to speed up a

pounds can be screened computationally much faster. “We can screen more than 100 million compounds a day,” Dr. Lim says. “Physically this could never be done. In the past, companies could only test a small subset. Technology speeds up the process.”

A successful partnership between pharma and technology also relies on trust and a

thorough understanding of each industry so alliances can work well together, according to Jackie Kent, senior VP, head of product at Medidata, which partners with more than 1,300 small and emerging biotech and pharmaceutical sponsors globally, as well as more than 100 CROs.

“A company can hire the smartest tech-

nology engineers and the most creative innovators, but if those professionals don't understand the uniqueness and the importance of the healthcare industry, there will be challenges,” Ms. Kent says. “We look for and want to be true partners. We like to think we are all part of the same industry and that we are not a software company having to learn about

laborious data entry process. The CRO was in search of a data science partner that could potentially shorten the development lifecycle of the drugs Biorasi was helping to get to market. Enter IBM Watson Health and its IBM Clinical Development solution.

“Within the actual conduct of a clinical trial there is a data capture element for which we have a technology solution called the IBM Clinical Development and it is a full SaaS, single instant, multi-tenant product,” says Mary Varghese Presti, VP of life sciences, IBM Watson Health. “We believe that there is enormous value to be had by using cutting-edge technology from a data capture perspective. By cutting edge, I'm talking about bringing a SaaS product into the space and then innovating along the critical control points, such as patient recruitment and e-consent.”

Preparing the electronic data capture (EDC) includes entering trial data into a number of forms and data validations for all phases of the trial.

The more intuitive a platform is, the more quickly trial data can be entered and analyzed. With the IBM Clinical Development solution, Biorasi's team was able to complete its study build faster, which ultimately reduced its average EDC deployment to a four- to six-week timeframe.

In addition to shortening the study build time, Biorasi also realized significant cost savings. The time-savings resulted in a build reduction of 25%, and because the solution required fewer man hours, it cut more than 50% off the full lifecycle cost.

Cost and time-savings are critical, as they ultimately can affect patients who are awaiting new therapies, Ms. Varghese Presti says.

IBM is also working on a study design product that marries real-world population

data with design thinking to make trials more successful, from start to finish, with the goal of bringing important medicines to market more quickly for the patients who need them.

FLATIRON HEALTH AND FOUNDATION MEDICINE

Marta Bralic Kerns, VP, business development, at Flatiron Health, describes the company's partnership with genetic profiling company Foundation Medicine (FMI) as a way for researchers to answer questions about cancer care. “By working together, we are able to link FMI's genomic data with clinical data from a patient's EHR to provide insights for researchers,” she says.

This linked Clinico-Genomic Database now consists of information from almost 50,000 patients — all de-identified. For the first time, researchers can now see genomic predictors of response, design clinical trials to identify those who are most likely to benefit, and even discover new treatment options for patients, Ms. Bralic Kerns says.

“As with any strategic collaboration, it was critical that our two organizations were aligned on a long-term vision — in this case we shared a goal to improve cancer treatment outcomes by learning from the experience of real-world patients being treated every single day across the United States,” Ms. Bralic Kerns says. “We have built something new for the industry, and we needed to give it room to evolve as we learn from the needs of researchers in this quickly evolving, dynamic space.”

JANSSEN CLINICAL INNOVATION AND TATA CONSULTANCY SERVICES

Janssen has collaborated with the

technology services company Tata Consultancy (TCS), with headquarters in Mumbai, India, to develop a platform solution — Connected Clinical Trials (CCT) — to engage directly with patients on clinical trial-related activities.

Bert Hartog, Ph.D., senior director, Janssen Clinical Innovation, says the platform is intended to be used for medication management, tracking adherence, and motivating patients to take their medication as prescribed with minimal effort on the patient's side. It can also be used to communicate with the patients via a smartphone app on study progress, share relevant information and education materials, and answer questions.

“The requirements came from Janssen and TCS built the platform in close collaboration with us through a series of iterations,” he says. “TCS has made the platform available as a commercial solution and we are using it in our trials. Other pharma companies have started using it as well. This is a technology solution that benefits patients, study sites, and sponsors. If used more broadly and consistently, it may drive further efficiencies to study sites that work with multiple pharma partners.”

The CCT platform uses digital technologies to make the trial experience more patient-friendly, while ensuring better compliance to study protocol, with features such as sensors, smart medications, wearables, and mobile devices that enable real-time data integration, analytics, and tailored patient support.

“TCS' vision is to provide a cloud-scale solution that addresses patients' needs as they traverse through various clinical trial stages, starting with enrollment through treatment and follow-up stages,” says Narayanan Ramaswamy, chief architect, life sciences, Tata Consultancy Services Ltd.



Failure is a natural and necessary part of the process for developing new drugs, but with evolving technologies, pharmaceutical companies have more opportunities to reduce the impact failure has on their bottom lines.

MARY VARGHESE PRESTI
IBM Watson Health

healthcare. This drives a different level of trust and a different level of relationship, so partnerships can be productive right from the start.”

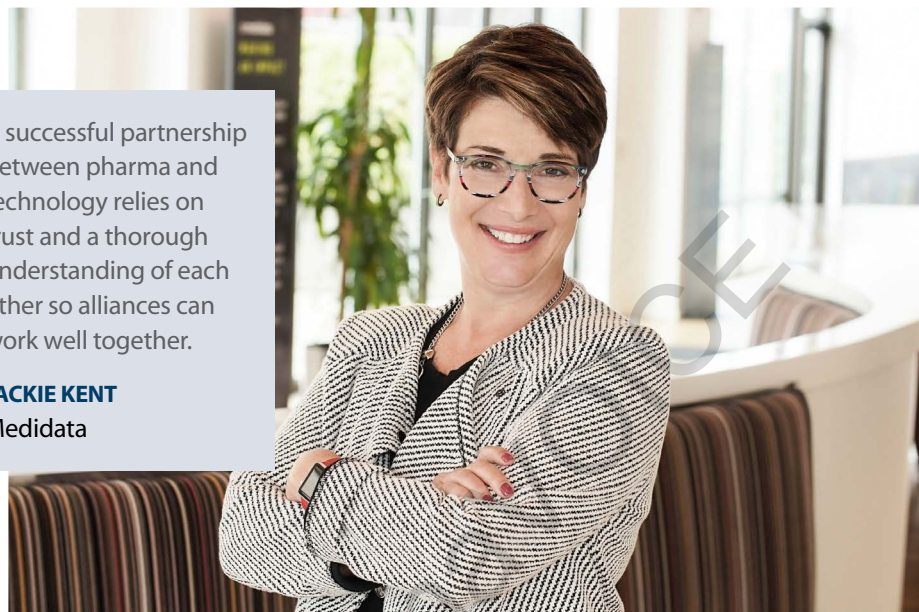
For technology companies new to partnering with pharma companies, the challenge is to articulate the value they bring. Clear value is essential in understanding the application of any new technology, says Adam Hanina, co-founder and CEO of AiCure.

“Articulating the value often derives from data, and with novel technologies, this often takes time,” he says. “It can take many years to build those data sets and publications to justify the reason for adopting technology. Companies may need to identify white knights in the organization who truly see the vision, adopt what you’re doing, and partner to develop the value of the data.”

Despite the challenges of proving the technology, Mr. Hanina gives pharma companies props for having a data-centric culture, which helps in blending partnerships and identifying the clinical and operational impact. “The life-sciences industry has an amazing culture that’s driven by data, which is how scientific decision-making occurs,” he says.

A successful partnership between pharma and technology relies on trust and a thorough understanding of each other so alliances can work well together.

JACKIE KENT
Medidata



“When thinking about partnering, there has to be a common voice of what the technology does and the function it serves. Technology companies need to be able to articulate a very clear ROI and scientific need for the additional implementation that will be added into a clinical trial.”

The Road Ahead: A Winning Combination

The collaboration of healthcare and technology can result in better end-to-end solutions, integrating various components of healthcare delivery and management. Such partnerships can bring opportunities for better care and clinical research with a reduced burden on the system.

According to Dr. Hartog of Janssen Clinical Innovation, the future is bright for pharma and tech company partnerships. “These partnerships will completely change the way healthcare is delivered and empower patients to receive the care they need, when they need it, and in a form that best fits their personal circumstances,” he says. “For example, with IoT and connected devices, many patient symptoms can be monitored continuously and remotely. This means patients won’t have to go to a clinic, and their measurements will not be affected by the stress a hospital visit can cause.”

Also, he says sensor technologies can quantify, in an objective way, many symptoms that cannot be measured today, or that are only reported by patients making the measures very subjective. “For example, frequently patients report that their sleep is significantly affected by their disease or treatment, and with sensor technology sleep patterns can be measured to



As pharma and life-sciences companies look to a future powered by a partnership between computers and humans, it is important to address societal and ethical challenges head-on.

ANDREA MCGONIGLE
Microsoft

greater levels of precision, allowing physicians to offer the best possible treatment,” he adds. “Same with activity; this now can be measured with wearable sensors. These data points are more precise, allowing better insights on how disease affects the way people live their lives, and over time, longitudinally, how a disease progresses or responds to treatment.”

Mr. Talbert of Roche Pharma Partnering says one of the promises of technology is that

©PharmaLinx LLC. Rights do not include promotional use. For distribution or printing rights, contact mwals@pharmavoices.com



Celebration

September 12, 2019

The Lighthouse at Chelsea Piers • New York

The **PharmaVOICE 100 Celebration** brings together inspirational and influential leaders from across all sectors of the life-sciences industry to engage in much-needed collaboration through the sharing of ideas, insights, and business perspectives, and to network in an intimate setting.

Imagining the Possibilities: the Future of Healthcare.

The **PharmaVOICE 100 Celebration** panel will explore the future of healthcare through the lens of innovative technologies, transformative business models, enhanced digital tools, and promising opportunities to improve the healthcare ecosystem for the ultimate stakeholder: patients.

Moderator



Melinda Richter
Global Head of Johnson & Johnson Innovation JLABS
PharmaVOICE 100 — Red Jacket

Melinda fosters Johnson & Johnson's external R&D engine and supports the innovation community by creating capital-efficient commercialization models that give early-stage companies a big company advantage. By providing infrastructure, services, educational programs, and networks in global hotspots.

Panelists



David R. Epstein
Executive Partner, Flagship Pioneering
PharmaVOICE 100 — 2010

David, who is also Chairman of Axcella Health and Chairman of Rubius Therapeutics, has more than 25 years of drug development, deal making, commercialization, and leadership experience. From 2010 to mid-2016 he served as CEO officer of Novartis Pharmaceuticals.



Amy Heymans
Founder, Chief Experience Officer, Mad*Pow
PharmaVOICE 100 — 2018

Amy plays an essential role in Mad*Pow's visualization of a changed healthcare system in the United States. She works with organizations to improve the customer experience, leverage design to drive change, and facilitate human-centric innovation.



Michelle Keefe
President Commercial Solutions, Syneos Health
PharmaVOICE 100 — Red Jacket

Michelle is an innovative healthcare executive with a proven ability to identify and capitalize on opportunities in the marketplace to improve competitive performance and deliver exceptional results.



Ritesh Patel
Chief Digital Officer — Health & Wellness, Ogilvy
PharmaVOICE 100 — 2018

Ritesh is a digital evangelist who is an outspoken advocate about the future of digital health. He is passionate about educating peers and clients about what digital transformation and innovation mean to healthcare.

Data silos across technology products can be a stumbling block when pharma starts to partner with a variety of technology players. Pharma needs to invest in solutions that can harmonize and repurpose disparate data sets across business areas.

SAGAR ANISINGARAJU
Saama Technologies



Successful partnerships depend on each company becoming knowledgeable enough about the other's domain to communicate effectively and understand the challenges and the benefits from the other's expertise and capabilities in the best possible way.

GREGG TALBERT
Roche Pharma Partnering



data and analytics will enhance the ability to improve clinical trial enrollment by identifying the best sites and best patient subgroups to participate in trials. "To achieve this outcome, we need a broad and detailed dataset, i.e. data at scale from across the United States and other countries to mirror the complex enrollment criteria for clinical trials," he says. "We also are increasingly using high-quality real-world data to simulate control arms of trials and supplement regulatory filings. The improved datasets and analytics will ultimately lead to large-scale clinical decision support tools for a number of indications that can help us to better match the right treatment to the right patient."

Recently, Roche discovered how algorithms help diagnose certain conditions, such as diabetic retinopathy and stroke. The expectation is that as better analytical methods and data sets evolve more diseases will be able to be better diagnosed. Mr. Talbert also expects that digital tools will fundamentally address challenges HCPs and patients currently face during the treatment of different diseases. "With the help of digital tools, we can work on addressing issues such as adherence and communication in between visits as well as improve dosing regimens," he says. "The same digital technology also allows for the expansion of telemedicine and remote clinical trials."

Dr. Heatherington from Takeda also predicts that digital technology partnerships will gain more traction in the future.

"For example, real-time patient monitoring via sensors or patient reporting via a device at home may reduce the number of necessary clinic visits while also helping us gain a better understanding of the impact of our drugs," she says. "Remote monitoring of disease or the use of easy-to-measure digital endpoints are both ways technology can make clinical trials more patient-centric."

Even before any tangible benefits are realized, pharma/technology collaborations help pharma companies adopt a more agile mindset to drug development, Dr. Heatherington adds.

"Some of the challenges in partnering across pharma and tech are also areas of greatest opportunity," she says. "On the pharma side, we can explore new ways of working, learn to be nimble, and look outside our own walls for expertise."

Andrea McGonigle, national managing director, health and life sciences at Microsoft, says the future lies in AI being seamlessly integrated into complete value chains, from research and development to manufacturing, and from supply chain to commercialization and operations.

"From IoT-enabled supply chains to ge-

netic diagnostics and pharmacogenomics, from clinical trials matching technologies to adaptive trials and real-world evidence, from using natural language processing to speedy identification of target molecules and cognitive services for tumor diagnosis and monitoring, AI is helping to solve for both organizational and clinical research-related issues in the industry today," she says.

At the same time, as pharma and life-sciences companies look to a future powered by a partnership between computers and humans, it is important to address societal and ethical challenges head on, Ms. McGonigle says. To that end, Microsoft has identified six ethical values to guide the cross-disciplinary development and the use of AI: reliability and safety; fairness and inclusivity; bias; transparency; accountability; and privacy and security.

Dr. Lim believes the future is already here, as pharma companies are focusing on the need to shorten the time to market and reduce costs. He believes through AI technology, drug development will become much more efficient.

"We're on the precipice of change right now because pharma partners are looking to technology to shorten the time scales and to tackle challenging targets that they haven't been able to pursue," Dr. Lim says. "AI is exciting to pharma companies because the technology lets them tackle many of the things that have long been challenging."

For example, historically a company was defined by how many compounds it had in its library, but now a company can have access to billions of compounds almost off the shelf and that can be ordered on demand. AI allows pharma companies to screen those compounds to look for novel drugs. AI also enables companies to identify targets for diseases that have had little attention. "This means we can start to think about diseases that have not been explored via R&D, and this is going to benefit patients," Dr. Lim says.

To prepare for the future, Watson Health is reimagining how to improve value all along the clinical development space through a network with data and analytics.

"We think that even cutting costs by 10% or 15% or accelerating timelines by a few months will deliver incredibly meaningful outcomes to everybody, to you, to me, to my mom," says Mary Varghese Presti, VP of life sciences, IBM Watson Health. "The sooner companies can determine if a development phase should be called off, the sooner they can save money and dedicate those savings to more promising projects."

Sophisticated analytics combined with deep insights into current scientific literature and other proprietary data may allow companies to, for example, halt a Phase II trial after

Report: Artificial Intelligence in the Life Sciences

- ▶ All of the largest 10 pharma companies (by revenue) have either partnered with or acquired AI companies to leverage the opportunities the technology presents.
- ▶ While some partnerships apply to clinical trials, the majority focus on drug discovery, reflecting the lower regulatory hurdles and the more advanced nature of available AI solutions.
- ▶ Developments in AI applications are occurring across the spectrum of pharma business, from target discovery to post-approval activities, and are being used to automate processes, generate insights from large-scale data and support stakeholder engagement.

Source: L.E.K. Consulting, Artificial Intelligence in Life Sciences: The Formula for Pharma Success Across the Drug Lifecycle

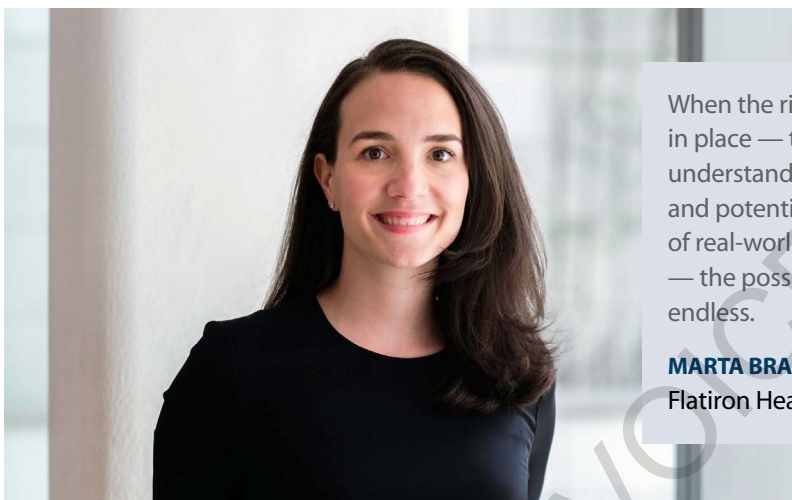
an ambiguous Phase I result. If the drug failed in Phase II, that alone would lead to a cost of \$17 million. “Failure is a natural and necessary part of the process for developing new drugs,” Ms. Varghese Presti says. “But with evolving technologies, pharmaceutical companies have more opportunities to reduce the impact that failure has on their bottom line.”

Technology, in particular AI, has already started to change clinical trial methodology, says Mr. Hanina, whose company uses AI to see, hear, and understand how patients respond to treatment.

“For example, we presented a scientific poster with a pharma company and the results showed that early behavior predicts future behavior,” he says. “If patients are going to be compliant in the beginning, they are more likely to be compliant throughout the whole trial. It’s important to have data points and lead-in periods for data enrichment strategies before we start to build algorithms.”

Ms. Kent from Medidata says the efficiency gains and cost reductions realized from technology are important from a business perspective. At the same time, partnerships with technology companies can also de-risk the clinical trials. Processes that used to be — or in some cases, still are — done manually to update data in clinical trials can now be done digitally, enabling a new level of up-to-the-minute oversight for trials.

“Advanced analytics are driving a differ-



When the right teams are in place — the ones that understand the nuances and potential applications of real-world datasets — the possibilities are endless.

MARTA BRALIC KERNS
Flatiron Health



Collaboration of healthcare and technology can result in better end-to-end solutions, integrating various components of healthcare-delivery and management with the potential to reduce the number of hand-overs and transfers.

DR. BERT HARTOG
Janssen Clinical Innovation

ent level of oversight and are having more of a business impact versus a cost impact,” she says. “For example, EDC data can be put in a dashboard next to CTMS data, which provides a different level of oversight for the clinical trial. I call it de-risking, because there is quality data that is up to date. This level of intelligence brings all of the data together and provides the most up-to-date information for the health and the oversight of a clinical trial.”

While the pharma industry has been working with CROs and other data players for more

than 40 years, working with tech companies to use big data and AI is barely a decade old. According to Sagar Anisingaraju, chief strategy officer at Saama Technologies, this relative “newness” can be a stumbling block as pharma would like to have more of a track record to bet on, and technology tends to appear risky in the beginning to the industry.

Another key challenge, he says, is with change management; in other words, the challenge is not just adopting technology but also updating and upgrading the surrounding processes to completely leverage the benefit. “Today, technologies provide a new way of asking questions, a new experience of context-specific data allowing for problems to be solved with a completely new lens. This means traditional standard operating procedures need to be changed and that can be a big hurdle for some pharma companies,” he says. “The change management aspect of it, whether it is training, whether it is repurposing people, or educating or changing their age-old rickety systems or breaking the data silos across functions, this is where the industry struggles.”

Looking toward the future, he would like to see more global partnering between technology and science, with all players in both industries working toward a common goal of sharing the learnings. He proposes a clinical neural network wherein the common errors, best practices, and the common insights are all accessible so that companies do not have to start from scratch for their drug development. “A clinical neural network would mean research sharing across thousands of studies conducted in different therapeutic areas by different companies,” Mr. Anisingaraju says. “This is one area where collaboration and cooperation from multidisciplinary pharma companies and the technology vendors would have a long-standing impact for patients, as well as for the pharma industry.” **PV**