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How life sciences can unlock its full potential

Using data from a recent Economist Impact study, we've mapped out a path for life sciences organizations to become future-ready between now and 2035.

The global life sciences industry will be unrecognizable in 10 years' time, as drug development, advanced manufacturing, supply chains, regulations and patient delivery all respond to an explosion of data and new demands for hyper-personalization.

This period of rampant change will give life sciences companies a significant chance to harness their organization's full potential. In a world with increasing populations, rising healthcare demands and ongoing scientific advancements in medications and treatments, these companies can create positive experiences and outcomes for an array of stakeholders.

The past few years saw vast changes in the industry as the pandemic spurred unprecedented collaboration among stakeholders and accelerated the use of technologies such as remote care delivery and process automation. These advances, however, only scratch the surface of what will play out in the life sciences space as rapid digitization continues alongside a deep science revolution.

In our work to define what it takes to be future-ready—and how close businesses are to reaching a future-ready state—Cognizant partnered with Economist Impact to conduct a survey of 2,000 senior executives from across industries and geographies, including 250 in the life sciences industry. (For the full report, see "Ready for anything: what it means to be a modern business.")

Based on the findings and our own analysis, we've prepared a roadmap, from now until 2035, of how and when these changes will likely unfold and the capabilities needed to enable them.

2023 to 2025: Fortifying the data foundation

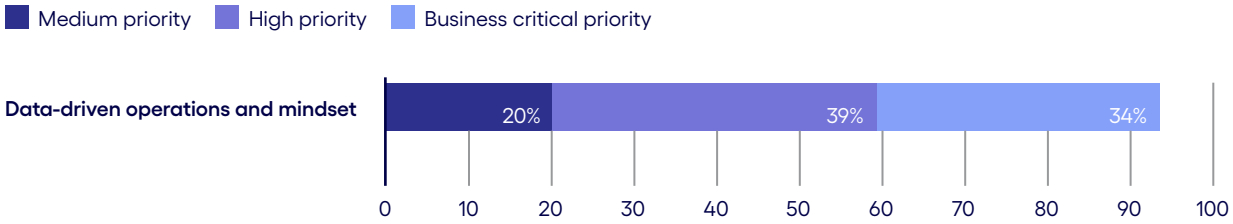
The rapid response to the COVID-19 pandemic was a testament to the increasingly critical role data plays in the development of modern therapies. It was years of data-hungry artificial intelligence (AI)-powered research into messenger RNA that allowed vaccines to roll off production lines so swiftly.

Now, life sciences executives are embracing advanced data strategies to accelerate time-to-market for new products or repurpose old products or prior areas of scientific investigation.

Our study made clear that executives in the sector are set to spend much of the next two years getting a foundation in place for the looming data deluge, whether that's storing and harmonizing non-competitive information, developing a forensic understanding of shifting scientific innovation, or uncovering new therapies missed by analytics tools of the past. Over one-third (34%) of life sciences respondents said building data-driven operations and having a data-driven mindset was a business-critical priority in their corporate strategy, and another 39% believe it's a high priority (see Figure 1).

Figure 1: Data is a critical priority

Q: To what extent does your company's corporate strategy prioritize data-driven operations and mindset?



Response base: 250 senior life sciences executives
Source: Economist Impact Survey 2022

Pfizer's development of Paxlovid, for instance, shows the role of data, combined with AI and machine learning (ML) models, in expediting drug discovery and development. Using modeling and simulation, Pfizer was able to quickly screen millions of protease inhibitor compounds to arrive at potential targets, as well as virtual screening to select the right molecular changes to enhance potency, according to a report on Pfizer's website. It then factored the data into the decisions on which compounds to make.

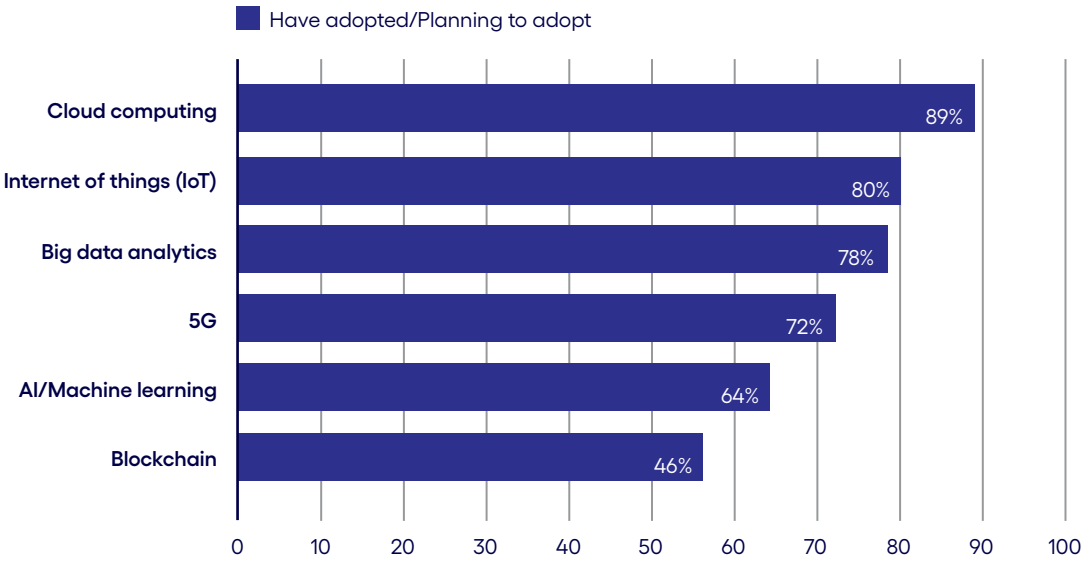
The use of these technologies reduced computational time by 80% to 90%, according to Pfizer, and fast-tracked development of the drug. Ultimately, AI and ML techniques helped the team design the drug in four months.

According to one study respondent—the digital director of a large pharma firm—the "wide variety of value-added, data-driven services currently available to the life sciences sector is just the tip of the iceberg." For instance, greater collaboration across the entire ecosystem, powered by data, is the route to greater patient-centricity, he said, including the availability of digital prior authorizations, referrals, care plan collaboration and workflow enablement across clinical, administrative and operational functions. "We refer to this as radically interoperable data, and it has the potential to disrupt the healthcare and life sciences sectors positively," he said.

As life sciences companies brace for the next two years of change, they need to prepare their technology foundation with massive computational power, cybersecurity guardrails and the ability to deal with an explosion of personal patient data. Our study revealed the technology investment priorities of life sciences organizations to set their foundation for the future (see Figure 2).

Figure 2: The data-powered tech dream team

Q: Which technologies and methodologies has your business already adopted, or is planning to adopt?



Response base: 250 senior life sciences executives
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Based on these findings, here are the four biggest technology areas essential for life sciences companies to be future-fit.

Cloud-powered computing. In short order, cloud computing has become a critical building block of modern infrastructure in the life sciences space, and as more data flows into the business, and new tools emerge to handle it, a robust cloud footprint will become increasingly important.

As the head of R&D in a biopharma company explained, "In the past, we used technologies like enterprise data lakes and data warehousing, which needed updating. But now, the flexibility of the common data layer and standard data model brings things to the cloud and gives a massive acceleration for doing anything else."

New modes of connectivity. The next two years will see the rapid deployment of 5G connectivity, as well as a suite of tools and technologies that will transform the way data flows around an organization. Beyond telemedicine, life sciences companies are pursuing new services and solutions to engage customers in new ways. These include home devices flowing data back to healthcare practitioners in real-time, as well as intelligent digital applications keeping track of patient responses to new medications.

According to a pharmaceutical executive, "Wearables will be a game changer as it will improve continuous patient health monitoring and drive the conversion from sick care to proactive healthcare in the next five years."

Tools to harness data. As we pointed out in a recent report, the volume of life sciences data is now beyond human-scale understanding. As a result, new data-powered tools—analytics and AI in particular—are moving up the agenda. According to an industry executive, "combining data science, artificial intelligence and natural language processing is helping us collect data in real-time. NLP assists researchers in quickly identifying, synthesizing, extracting and analyzing the pertinent data in clinical trials and selection criteria."

We recently worked with a major pharmaceutical research company to automate the analysis of data in clinical trials research for oncology treatments. The solution uses text mining to automatically review more than 10,000 online resources, such as medical journals and scientific research publications. Using the system, the company has reduced review time for drug outcomes from 20 months to 20 days, and trimmed up to four years off the full oncology drug development process, which can take 10 to 18 years.

Beyond R&D, new AI capabilities offer fresh solutions to age-old problems. Recent developments in generative AI, for example, offer executives new toolsets to create reports from clinical tests or develop personalized materials to match the increasingly precise nature of therapy development.

Transparency and security. Cybersecurity continues to be a significant strategic focus for life sciences executives, ranking as the top priority in their digital strategies. Personalized medicine will further raise the cybersecurity stakes, as it will call for the systematic collection, storage and analysis of large volumes of personal and confidential data.

This is why we'll see life sciences increasingly use blockchain to do business across organizational and enterprise boundaries. Distributed ledger technology (DLT) is being used by more businesses to securely and transparently share supply chain information to solve challenges like drug provenance and sustainability reporting. Although DLTs were primarily motivated by efficiency, life sciences companies will also need to investigate higher-value use cases that improve experiences, such as giving patients access to transparent pricing.

Blockchain may also increase customer trust by encouraging patients to disclose their data due to the validity and integrity of data kept in blockchain networks.

2025 to 2030: Forging the path to patient-centricity

Patient centricity has long been a buzzword that's refused to move beyond its hyperbolic origins. However, many challenges—including a lack of comprehensive patient data, challenges scaling clinical trials, underinvestment in patient education, and legacy operating models—hamper life sciences' efforts to achieve this lofty goal.

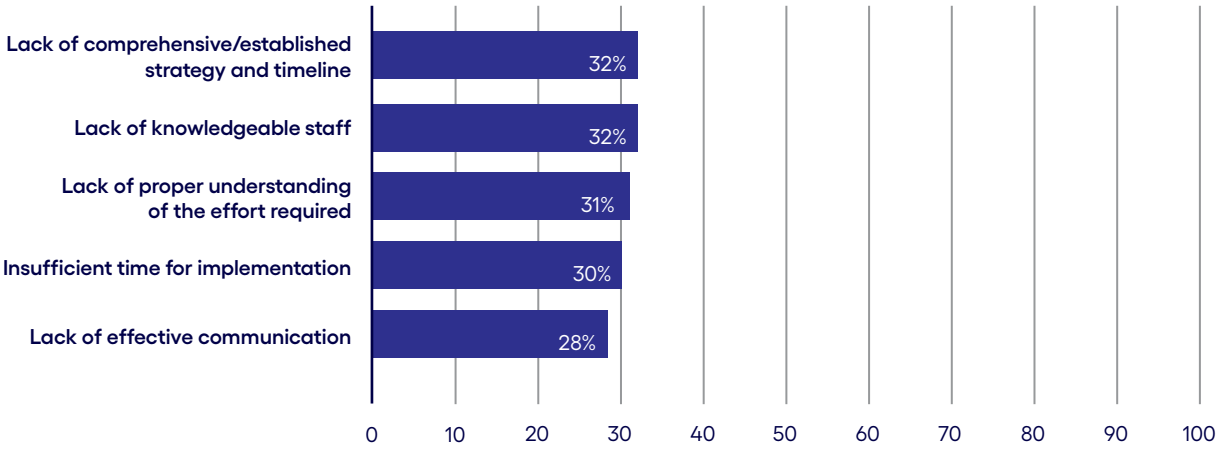
Life sciences businesses will also need to develop the digital foundation to support patient-centricity, from the analytical heft to develop precision medicines based on genetic code, to the infrastructure needed to flow individualized patient data from medical devices.

In our study, life sciences organizations expressed several challenges to implementing new processes, services and technologies such as those needed to evolve the business and operational model toward a patient-centric one (see Figure 3). Over one-third pointed to a lack of established strategies that detail the time, resources and effort necessary to truly transform the business.

Many organizations, it seems, are struggling to move past their physician- and health plan-centric view of the patient, with engagement models reliant on what worked in the past, rather than what is geared for success in the future.

Figure 3: Key challenges muddle the way forward

Q: What are the most significant challenges your business faced when implementing new processes, products, services and technologies in the past year? (Respondents could select five top challenges)



Response base: 250 senior life sciences executives
Source: Economist Impact Survey 2022

Yet, now more than ever, life sciences companies have access to new digital technologies and capabilities to forge ahead with patient centricity. More resilient telecommunications networks, based on 5G and 6G connections, will enable medical device makers to remain in continuous communication with their products, enabling the devices to move out of the healthcare facility and into patients' homes or offices. Data—ranging from maintenance information to patient alerts—can flow back to the manufacturer's support team, who can liaise with other healthcare practitioners as needed.

As traditional barriers disappear, we can expect more systemic change. Everything from supply chains to regulatory reporting will realign to prioritize patient safety, education and engagement. We will see direct-to-patient services and a push for greater transparency as the sector sets its sights squarely on patient centricity and precision medicine.

The transformative power of data, combined with rapid advances in AI and analytics, will enable the following changes in the patient experience.

AI will become the personalization engine. Life sciences companies will use analytics and AI programs to enable precision medicine. For example, according to the chief data and digital officer at a US-based life sciences firm, AI and ML are enabling the creation of knowledge graphs that decipher the connections between gene targets, expressions and diseases.

We'll start to see precision medicine target the unique therapy requirements of individual patients. This will involve deep-learning capabilities that not only comb through clinical data but also factor in variability in genes, environment and lifestyle to determine disease treatment and prevention.

Meanwhile, advances in nanotechnology are expected to unlock targeted treatments such as edible microchips that respond to wireless transmissions by releasing sequential drug doses to treat diseases. Today's battery-powered wearables could soon make way for self-powered wearable biosensors to help with early detection of conditions such as heart diseases and diabetes.

New modes of engagement and education. According to one pharmaceutical executive, the greatest barrier to advancing personalized medicine is educating patients on how to use it, and helping them understand how their information is being used.

AI, combined with existing modes of communication, such as social media, offer one solution. For example, a biopharma firm's chief digital officer described the company's use of an in-house chatbot that uses Facebook Messenger to deliver critical information to patients about respiratory ailments such as asthma or chronic obstructive pulmonary disease (COPD) in more than 13 languages.

As modern medicine becomes more personalized and precise, so too must the ways in which healthcare organizations engage with their customers. From a regulatory standpoint, new hurdles are likely to emerge that touch on this key issue. Well-governed data sets and explainability built into AI solutions are critical to helping patients, regulators and other parties understand how and why a specific treatment was recommended or produced for a patient.

Ecosystem interoperability will become the norm. For innovation to thrive, data needs to be shared seamlessly. The future of highly personalized, targeted treatments will be possible with a collaborative ecosystem of patients, providers, academia, startups and regulators, powered by data.

In the US, for instance, pharmatech startups are looking to data mining and dashboards to induce transparency in the pharmacy benefits market, an opportunity estimated to be worth more than $750 billion by 2030.

Stalwarts such as Pfizer and Merck, meanwhile are working with oncology startup Strata to speed cancer diagnosis by analyzing minute tissue samples. Benching, a virtual R&D platform provider, played a crucial role in the development of the COVID-19 vaccine by allowing industry and academia to collaborate. Life sciences companies are also using unified platforms to cut down on administrative tasks and improve decision-making.

2030-2035: Preparing for the quantum revolution

Looking ahead, the pressure will only intensify to speed the time to market of new drugs and therapies and reduce the cost of doing so. What is needed is a new technology paradigm that will reinvent the life sciences business model by connecting data, knowledge, people and insights.

Enter quantum computing. Pharmaceutical R&D is now replete with fields of research that offer potential use cases for quantum computing. These include quantum simulations for molecular design, molecular similarity, protein folding and protein-ligand interactions. Other applications include the modeling mechanisms of drug action, biomarker discovery, quantitative structure activity relationships, and modeling the behavior of larger biological systems.

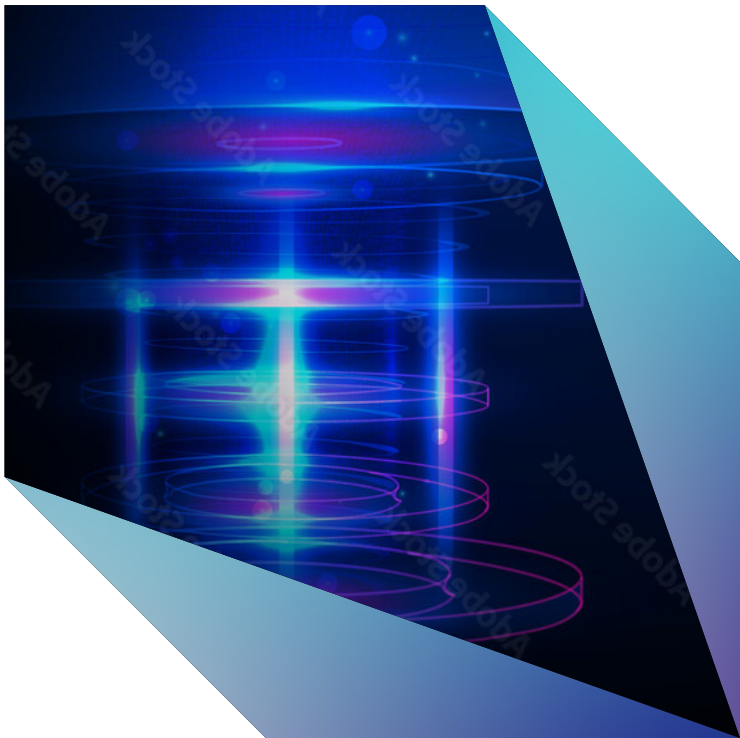
More broadly, pathology and image analysis, precision and personalized medicines and genetics—particularly linking our personal genome through cell and gene therapies to radical new health outcomes—all involve complex computational systems that would benefit from quantum computing.

We can see the path forward by looking at the recent past. Huge improvements in computing power have already made the practical deployment of AI for solving complex problems a realistic possibility. From image data analysis to evaluate the molecular structure of a compound, to making diagnoses by analyzing radiology data, AI use has seen rampant growth and improvement in the last 24 months. This progress has prompted substantial investment and significant partnering and acquisition activity, including between major pharmaceutical companies and leading AI providers and startups.

All this activity is opening the door to new configurations between life sciences firms and hyper-scalers, leveraging massive computing power and mastery with data. Quantum computing could follow a similar trajectory, with systems capable of practical deployment in R&D being a realistic possibility by 2035.

The rise of the integrated ecosystem. We can also expect to see more intentionally interconnected ecosystems—sharing data and resources to help develop new therapies. A significant driving force will be the shift from winner-takes-most drug development for major illnesses, to the personalized development of unique precision medicines. In this new economic model, traditional supply chains will make way for integrated ecosystems that pool capability.

Take the hypothetical example of a deeply personalized therapy for a specific individual. Rather than diagnose and assign a best-fit therapy, precision medicine will extract and process the patient's genetic, environmental and socioeconomic data to develop a bespoke solution. Such solutions will require customized manufacturing, not mass-production of single therapies in large facilities. Instead, we will see healthcare facilities mapping data straight through to life sciences companies, which will develop the therapy and pass it back to the patient.



The new supply chain, then, will consist of small, localized manufacturing plants sitting directly next to healthcare facilities—a huge change for today's globalized manufacturing operations. This interconnectedness will need new, advanced and hyper-secure communications, storage and processing capabilities to succeed.

These more localized, dedicated manufacturing facilities will, themselves, rest on an evolved digital foundation. The 3D printing of medications, speedily following a diagnosis in a neighboring healthcare facility may sound like science fiction—but the direction of travel is firmly set in this direction.

Securing genetic jewels. Even with new modes of development and production, old challenges remain. As the quantity and quality of data increases to meet this new personalized and precise form of medicine, so too will the threat of security breaches. Today, it's difficult to imagine hackers running off with the code that makes up an entire human being—but history shows us, little is safe.

Similarly, new processing power—particularly quantum—stands to challenge even today's most robust security protocols. In the future, the entire healthcare ecosystem will spend considerable resources designing and managing complex, interconnected networks that are likely to face constant attack, and from toolsets that move from helping the sector, to harming it.

Blueprint for change: Preparing for the next decade

The next decade will present as many opportunities as challenges for the rapidly evolving life sciences sector. While today the focus remains on dealing with immediate waves of economic uncertainty, leaders in the sector cannot hold back on vital transformation work. Slowing progress on building critical digital foundations today will have an outsized impact on a company's ability to perform, especially as new expectations for personalization crystalize and ecosystems of highly interconnected organizations develop.

To get there, businesses should focus their efforts on the following:

Replicate the agility of small-cap firms and startups

Large companies can respond to a rapidly changing landscape by adopting the culture and operating models of small-cap firms and startups. This entails fostering a culture of innovation, adaptability and rapid decision-making.

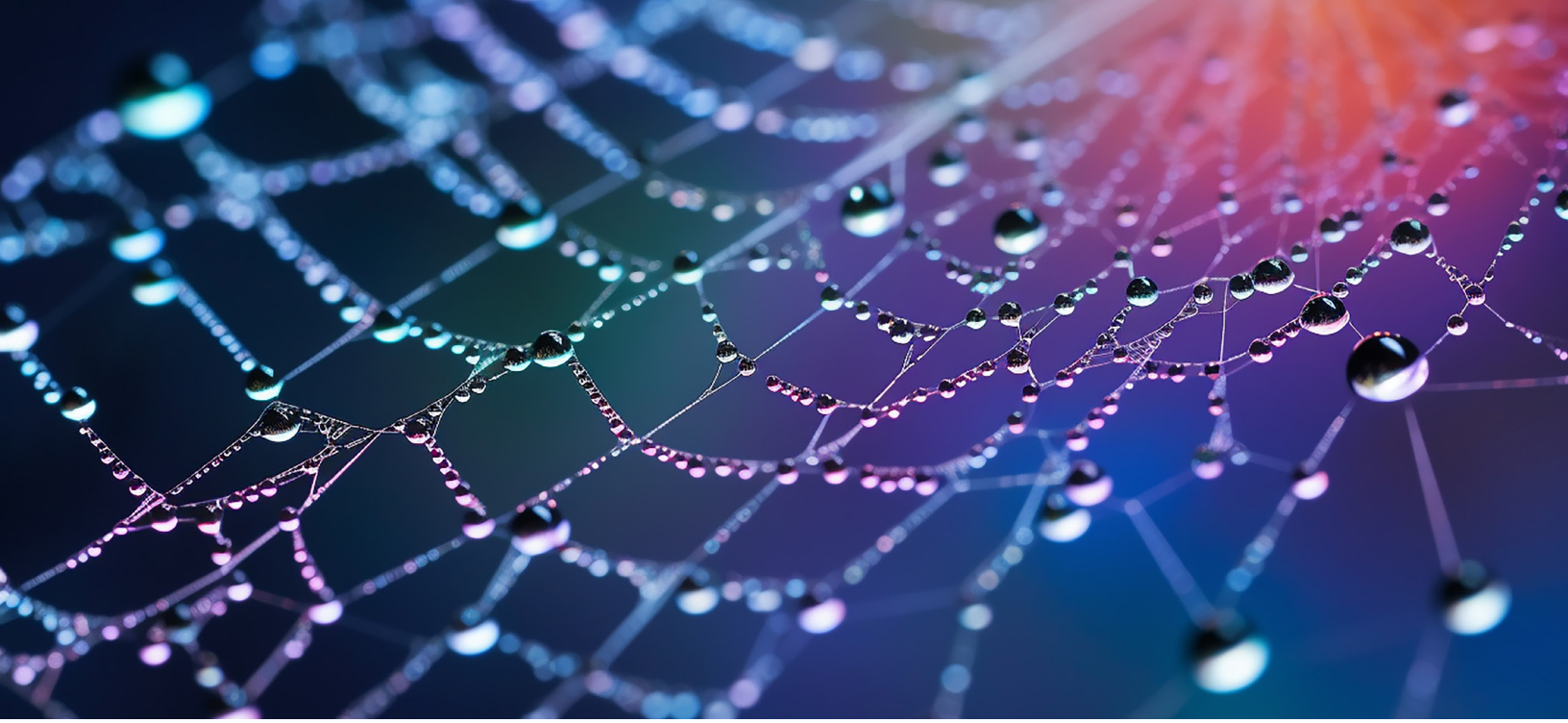
For instance, during the pandemic, major vaccine producers like Moderna and Pfizer collaborated with smaller firms to shorten production times and create new paths for clinical trials. This shift enabled them to swiftly develop and distribute vaccines, demonstrating the effectiveness of this approach in responding to market demands.

Crucially, the speed at which small-cap firms are able to mobilize around new innovations and products is disrupting the market at large. In 2022, 65% of new drug approvals were granted to small and mid-sized biopharma companies, significantly outpacing large pharmaceutical manufacturers. Agile companies like Mirati Therapeutics, Dermavant Sciences, BeiGene, Pharming and Marinus Pharmaceuticals are receiving FDA approvals and commercializing innovative products. We are likely to see more upstart companies outpace legacy pharmaceutical brands.

Measure what matters

It's crucial for companies to regularly evaluate their investments and ensure they align with industry-wide priorities. For example, Pfizer, in its pursuit of agility, focused on improving its R&D productivity. By the end of 2020, Pfizer achieved an industry-leading clinical success rate of 21%, a remarkable increase from 2% in 2010.

This accomplishment demonstrates the importance of aligning investments with industry trends. Large companies should assess the agility of their application estate to ensure they are prepared to take actions such as divesting underperforming units or acquiring fast-growing segments to remain competitive, in a timeframe that makes the ROI of the decision worthwhile.



Build a decision-making framework

Companies should establish a robust decision-making framework to effectively navigate the dynamic technological and business landscape. Pfizer again serves as an example of this approach.

The company adopted a "predict then optimize" framework, which helped identify trends to invest in and determine the necessary platforms and partnerships to succeed. Customizability is key; the framework should be adaptable to the company's unique operations. In a rapidly evolving market, these frameworks aid in making informed decisions and ensure alignment with the company's operations and objectives.

Break down siloes and institutionalize resources

Analysis published by Cognizant Research highlights the challenges life sciences companies have with siloes and federated operating models. In practice, businesses need a greater balance between a high degree of autonomy in business units and a centralized ability to ensure skills and resources flow to areas of the business where they can provide the most value.

This approach optimizes resource allocation and enables the development of strategies that benefit multiple value streams. For example, a single platform like generative AI can be used across different business areas to enhance outcomes and reduce resource consumption—rather than each siloed business unit embarking on their own journey.

Develop organic strategies and tap into new revenue generation opportunities

Companies can address unmet industry needs by developing internal organic development capabilities to find solutions to challenges where no existing answers are available—building solutions in-house where possible, and then examining new commercial opportunities.

An example is Eli Lilly, which built a sensor-based clinical trials solution internally and now seeks to sell it to other life sciences companies, creating a new revenue stream. This approach not only solves internal challenges but also generates additional income. Companies should be proactive in identifying unmet needs within their industry and building solutions that can be monetized.

About the authors

Rohit Alimchandani
Vice President, Head of
Life Sciences, Cognizant

Bryan Hill
Vice President, Digital Health &
Innovation, Chief Digital Officer,
Health Sciences, Cognizant

Ollie O'Donoghue
Senior Director,
Cognizant Research

Gaurav Sharma
Global Client Partner,
Health Sciences, Cognizant

Gagan Syal
Senior Vice President,
Life Sciences, Cognizant

Methodology

To better understand the state of the modern enterprise and how leaders are preparing for long-term success, we commissioned Economist Impact to conduct a survey of 2,000 senior business leaders across North America, Europe and Asia-Pacific. The study assesses and compares businesses across ten countries [Australia, Canada, France, Germany,The Netherlands, Norway, Singapore, Sweden, UK, US], in eight critical industries [Banking and Capital Markets, Healthcare, Insurance, Manufacturing and Industrials, Retail & Consumer Goods, Life Sciences, Entertainment & Media, Utilities] using a range of metrics that characterize what it means to be a "modern business," including vision, talent strategy, technological readiness, environmental sustainability and social responsibility.

This survey formed the core data set for a future-ready business index, based on multiple data feeds, that helps leaders understand what they need to do now. There are lots of data sets out there, but not a single engine (an index) that allows business leaders to utilize all the information to evaluate their enterprise and make decisions. Contact Cognizant for more details. For a more detailed methodology from Economist Impact, visit the program site at Modern Business. The views and opinions expressed in this report are those of Cognizant and do not necessarily reflect the view and policies of Economist Impact. Data presented is from an Economist Impact executive survey, commissioned by Cognizant, conducted in early 2022.

For more on this topic, visit our life sciences webpage or contact us.

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World Headquarters
300 Frank W. Burr Blvd.
Suite 36, 6th Floor
Teaneck, NJ 07666 USA
Phone: +1 201 801 0233
Toll Free: +1 888 937 3277

European Headquarters
280 Bishopsgate
London
EC2M 4RB
+44 207 297 7600
Email: infouk@cognizant.com

India Operations Headquarters
#5/535 Old Mahabalipuram Road
Okkiyam Pettai, Thoraipakkam
Chennai, 600 096 India
Phone: +91 (0) 44 4209 6000

APAC Headquarters
1 Fusionopolis Link, Level 5
NEXUS@One-North, North Tower
Singapore 138542
Phone: +65 6812 4000
Email: inquiry@cognizant.com

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