

Re-inventing Pharma with Artificial Intelligence

Three steps for pharmaceutical companies to seize the \$250bn Al value potential in the future of health

Contacts

Austria

Matthias Schlemmer Partner, Strategy& Austria +43-664-5152-939 matthias.schlemmer@pwc.com

Germany

Dr. Christian Kaspar Partner, Strategy& Germany +49-170-9362-692 christian.kaspar@pwc.com

Dr. Jens Neumann Partner, Strategy& Germany +49-172-2337/689 jens.neumann@pwc.com Dr. Thomas Solbach Partner, Strategy& Germany +49-170-2238-477 thomas.solbach@pwc.com

Switzerland

Matthias Leybold Partner, PwC Switzerland +41-58-792-1396 matthias.leybold@pwc.ch

United Kingdom

Colin Light Partner, Strategy& UK +44-7782-329-322 colin.m.light@pwc.com Thalita Marinho Partner, Strategy& UK +44-7900-163-439 thalita.marinho@pwc.com

United States

Ronald Chopoorian Partner, PwC United States +1-973-449-6042 ronald.chopoorian@pwc.com

Philip Sclafani Partner, PwC United States +1-631-767-2540 philip.sclafani@pwc.com

About the authors

Dr. Christian Kaspar is a partner with Strategy& Germany leading the Digital and Technology Strategy practice in Europe. Based in Munich, he advises clients in the pharma, MedTech and healthcare industries on IT transformation projects, technology innovations, as well as data and Al strategies.

Dr. Thomas Solbach advises clients in the healthcare and life sciences industry globally. He leads the pharma and life sciences practice at Strategy& Europe. Based in Frankfurt, he is a partner with Strategy& Germany.

Hans-Fabian Ahrens is a manager with Strategy& Germany, based in Hamburg. He supports clients predominantly within the pharmaceutical sector around technology, data, analytics, and AI strategies. Johannes Dizinger is a manager with Strategy& Switzerland and is based in Zurich. His expertise lies at the intersection of pharma and life sciences, technology, data analytics, Al and digital strategy.

Jonathan Müller is a manager with Strategy& Germany. Based in Hamburg, his focus topics include data-driven transformation and business model innovation, particularly in the life sciences and digital health industry.

Christelle Azar is a senior associate with Strategy& Germany. Based in Berlin, she advises clients on topics around technology and data as well as AI with a focus on the pharma and life sciences industry.



To discover all pharma use cases that were considered in this study and many more, including many demo videos, explore PwC's Al use case compass: pages.pwc.de/applied-ai-compass-app/

Pharma races to seize the \$250bn AI opportunity

We expect the future of pharma and healthcare to be personalized and digital, with increasingly blurred boundaries between prevention and treatment. Artificial intelligence (AI) is accelerating this convergence of pharma, broader healthcare, technology and consumer products and generates great benefits for each sector. Pharmaceutical companies can lead the way and incorporate AI into new products and services directly, or profit indirectly by using AI to make processes more productive and efficient. The focus of this report is the indirect value from AI and the respective AI use cases.

In the last year, most pharmaceutical companies focused on understanding the impact on their business from AI and prioritized specific use cases that would help them stay ahead. As such, we based our research on an analysis of more than 200 AI use cases with 25 experts and thought leaders from healthcare, pharma, and technology with the following results:

- Pharma companies that industrialize AI use cases across their organizations have the potential to double their operating profit in 2030
- Al use cases in operations account for 39% of the impact by boosting efficiency on the production, material, and supply chain costs
- R&D accounts for 26% of the impact, followed by commercial at 24%, with AI increasing efficiencies in developing new medicines and opening up new ways of interaction
- Pharma's enabling functions contribute 11%, with AI increasing the speed and efficiency
 of supporting processes such as IT, finance, HR, and legal and compliance
- In total, pharma companies could gain an additional \$254bn in annual operating profits worldwide by 2030, assuming a high degree of industrialization of AI use cases; the additional AI value would include \$155bn in the US and \$33bn in Europe (EEA, Switzerland, and the UK)
- We expect that AI will exceed this impact in research beyond 2030 by far, leading to an even higher divide between AI leaders and followers in terms of revenues and value chain efficiencies

Our observations show that a major share of the industry is already getting started and has agreed on high priority AI use cases. But only very few companies are successful at operationalizing selected use cases at scale. We identified three critical steps that pharma companies should follow in order to realize the full AI potential:

Organize for delivery	Pharmaceutical companies need to assess and build organizational structures to execute their priorities fast. So far, hybrid delivery models with cloud hyperscalers and an implementation partner are delivering faster than internal, IT-led or vendor-led constructs.
2 Establish incubators	The creation of processes for incubating innovation and the setup of dedicated teams to experiment with the rapidly evolving models and adjacent technologies (e.g., LLM Ops platforms) is separating leaders from followers.
BOI follows adoption	As AI products are delivered, the way that business is executed will fundamentally change with great impact on the workforce. Products only capture value if they are used with responsibility and impact. Top-down programs are required to address concerns and drive adoption.

"

Pharma companies that industrialize AI use cases across their organizations have the potential to double their operating profit in 2030. For now the greatest impact will occur on operations. Beyond 2030, pharma will be re-invented with AI-powered R&D."

Dr. Christian Kaspar in Handelsblatt, March 2024

AI will generate significant value across the pharma value chain

With AI disrupting the broader healthcare industry and holding immense potential for the future, there are different ways for pharmaceutical companies to unlock value (see *Exhibit 1*): On the one hand, AI-enabled products and services disrupt and complement current pharmaceutical business models. We also refer to this pathway as "direct AI value" (see section three for an outlook). On the other hand, AI enhances existing business models and value chains by increasing synergies, improving outcomes, boosting revenues, and saving costs within the pharma business model. This pathway, which we also refer to as "indirect AI value", is in the focus of this study.

EXHIBIT 1

Al value realization for pharmaceutical companies



EXHIBIT 2

Overall profit potential from indirect AI value realization in 2030 (showing top three use cases only)



Source: Strategy& analysis

For this study, we investigated over 200 use cases that leverage AI from our industry experience and past client projects. The use cases were evaluated for their indirect value contribution to a typical innovative pharmaceutical company with an operating margin of 20%. Each use case was connected to baseline elements of a pharma profit and loss (P&L) baseline. We interviewed 25 experts and thought leaders from healthcare, pharma, and technology who estimated the range of impact that each use case would have on the P&L elements when fully implemented. Some steps in the pharmaceutical value chain had more use case possibilities than others. We therefore added a marginal utility function to model the decreasing benefits of additional use cases for each process. In addition, the interviewees evaluated the degree to which the cases will disrupt existing business and operating models and the cases' feasibility of implementation. Al use cases in operations account for 39% of the impact as they affect the greatest cost baseline including production, material, and supply chain costs. Research and development (R&D) accounts for 26%, closely followed by commercial with 24% – at both, AI does not only increase efficiency but also revenues by shaping new medicines and new ways of interaction with the market. Enabling functions contribute another 11% of the potential by driving speed and efficiency in supporting processes such as IT, finance, HR, and legal and compliance.

Overall, pharma companies that industrialize AI use cases completely across their organizations have the potential to double today's operating profits by boosting revenues and reducing costs. We expect that this industrialization process will begin to be fully realized by companies prioritizing AI by 2030. Our model also takes into account different speeds of AI adoption, with the US leading the way, followed by emerging markets, and Europe.

In total, pharma companies could gain an additional \$254bn in operating profits worldwide by 2030, assuming a high degree of industrialization of AI use cases. This additional AI value would include \$155bn in the US, \$52bn in emerging markets, \$33bn in Europe and \$14bn in remaining countries. This extrapolation is based on a 5.7% CAGR of the pharmaceutical industry without the effects of AI.



EXHIBIT 3 Global distribution of the Al value potential

Source: Strategy& analysis

Al value in research and development

R&D is crucial for innovative pharmaceutical companies to maintain competitiveness. It enables timely market entry of innovative drugs to secure first-mover advantage, capture market share, and generate revenues. The key levers for research success are to be the "first-in-class" or to be "best-in-class" for a modality. While companies today can forecast development timelines, the probability of success for clinical development is hard to predict. In clinical development, taking the new medicine at speed and cost to the market is key for commercial success. Looking at the declining return on investment, R&D is in dire need for an AI re-invention. Structured decisions to in-source or outsource and clear triggers for stopping clinical trials are rare today and realizable with AI. The trend toward more personalized (AI-enabled) treatments implies that the patient populations being targeted are becoming smaller, which adds to the strain on R&D to increase performance on budget.

Al presents multiple opportunities to address these R&D challenges. The potential of Al to accelerate drug discovery is demonstrated by Merck's AIDDISON, an innovative drug discovery SaaS platform that screens a 60 billion pool of compounds and suggests ways to synthesize the new drug.¹ Separately, researchers examined deep learning models on the Chemprop AI platform to unveil the first new structural class of antibiotics that has been discovered in decades.² In our analysis, research and pre-clinical AI use cases account for 18% of the overall operating profit potential, mainly because they include strong revenue drivers. We believe that Al will eventually be able to predict the success of compounds in the years to come more accurately and our use cases, such as the optimization of disease area focus (2-29% of overall Al potential) and Al-target discovery (5-14%) reflect this potential. Al models not only be able to predict the properties, effectivity, or toxicity of new compounds, but also discover novel effect mechanisms and APIs. AI algorithms are able to collect, transform, aggregate and make use of much more data than was ever possible before. However, Al use cases face some hurdles due to factors such as limitations of current protein docking simulations/in-silico models, confined translational science advancements and complexity of pharmacokinetics (PK) and pharmacodynamics (PD) in the human body, resulting in the clear need to apprehend potential and limits of use cases.

For pharma development, AI use cases can both accelerate the trial process and inform critical trial design and gate decisions, such as in- or outsourcing and, if relevant, principal investigator (PI) and site selection. So far, pharma companies mainly use AI to drive operational excellence in within trials, like Amgen applying their *Analytical Trial Optimization Module (ATOMIC)*.³ However, other use cases also take a quite prominent rank in our analysis, e.g., the usage of synthetic data to create entirely simulated patient populations (3-6% of overall value potential) and the enhancement of patient experience during trials with AI-based automation and personalization (2-4%), or the orchestration of multiple and decentralized trials. Overarchingly, AI will act as a support for any repetitive task in R&D such as automated document and text creation for lab notebooks, health records, and regulatory submissions whilst increasing speed and output of affected teams.

Pharmaceutical companies can leverage these use cases by enhancing their processes with AI-based R&D software such as *Schrödinger* or *Verge Genomics*, sourcing the necessary data und upskilling their R&D departments. In other cases, such innovative AI companies build their own drug pipeline around their algorithms such as *Exscientia* or *Insilico Medicine*, which have then facilitated new partnerships and investments by big pharmaceutical companies. Nonetheless, the overall complexity of AI-powered R&D and the level of disruption that it brings for internal processes remains high.



We expect AI use cases to start creating value with impact in development operational excellence first. And while these results can be validated directly, AI-discovered drugs will take longer time to prove their impact until they take a larger share in the portfolio of pharmaceutical companies. In the future, we foresee that AI could truly re-invent research in the long term by creating artificial patients and thereby minimizing risk for humans from the development process. Until this breakthrough, the mentioned use cases most likely payout for those willing to prioritize high AI investments and uplift their entire R&D ecosystem with them.

Al value in operations



When looking at pharmaceutical operations we typically consider the domains of procurement, production, quality and supply chain management. Operations plan and execute the supply and distribution of high-quality products based on forecast demand. Al is a key driver of more data-driven, measurable, and transparent decisions, especially once high portfolio and manufacturing complexity and pressure from drug shortages is added to the mix.

Operations has the highest AI potential in the pharmaceutical value chain (39% of overall AI potential) because related use cases can affect a large part of the costs of pharma companies. Currently, adoption of AI in operations across industries remains relatively low, as many applications require more data collection and changes to the manufacturing infrastructure. Our analysis shows that many use cases can also be applied to existing facilities while only requiring process or decision framework changes.

In procurement, automating catalog maintenance accounts for 3-5% of pharma's overall AI potential and AI indication of procurement risks constitutes 3-6% of the potential – both reduce direct material cost in the long term.

Production has been an attractive area for AI application for years. For example, *Sanofi* has partnered with *Aily* Labs to develop *plai*, an AI platform that supports manufacturing, among other processes. The platform is helping *Sanofi* to optimize its use of raw materials, contributing to the company's environmental objectives and supporting improved cost efficiency.⁴ In addition, optimization of manufacturing scheduling and output based on AI sensing demand and supply needs is expected to deliver outstanding value, reducing production costs by up to 10%, representing 5-11% of the overall value potential from AI. Another case is the application of digital twins and predictive maintenance for facilities (2-7%) that, for example, indicate when machine parts need replacing by analyzing vibrations or voltage patterns and predicts stoppage.

The quality function has to deal with challenges in transparency on product quality, cumbersome manual quality processes, and the difficulty of understanding the root causes for issues. All helps with multiple use cases such as predictive quality management (5-13%), where deviations can be identified in time and occurred problems can be reviewed for root causes automatically. All generating quality documents, such as incident reports, adds 4-11% to the overall Al value potential.

The most impactful AI use case for the supply chain is enhanced demand forecasts (5-12% of the overall AI potential). As AI in the supply chain has to be applied to complex worldwide production footprints, many examples are focused on specific subsets of the supply network. *Pfizer* leverages AI in collaboration with *Controlant* to optimize inventory prediction, employing a data tracking system that is compatible with GPRS signals for real-time monitoring of vaccine and component deliveries.⁵

Each use case individually has a fairly low level of complexity with limited internal disruption. Some AI use cases, like predictive maintenance, have been around for years but have not been implemented at scale yet. The challenge remains twofold in harmonization and prioritization: Pharma operations are mostly fragmented by regions, technology, processes, and operating model setups that are hard to optimize synchronously. Thus, the broad introduction of AI either implies large transformation programs or selected implementation for new or refurbished sites. Despite these challenges, we recommend making the use of AI in pharmaceutical operations a priority because of its large potential.

Al value for go-to-market and commercial

The commercial success of pharmaceutical products largely depends on the right strategy, including pricing and market access, and sales and commercial models. Al can help to provide the insights to support strategic decisions and day-to-day operations.

On a strategic level, enhanced accuracy from commercial analytics and market trend analysis is a major driver for increased revenue (2-6% of overall AI potential). Scientific information platforms that enable commercial users to navigate complex medical and regulatory frameworks for market access strategies account for 2-5% of the AI value potential. For example, large language models can be used here to let users query regulatory bodies while other models can predict the success of submissions to the authorities.

In pricing, AI applicability is largely dependent on each market's data availability and regulative environment. Such differences are the main reasons for the different levels of value from Al that pharmaceutical companies will see in different regions. Al can perform simulations of reimbursement and pricing models to evaluate the impact of different scenarios on the profitability of market access for pharmaceutical products. It can combine real world data on patient populations with the data from clinical trials to deliver parameters for pricing models that are optimized to appeal to payers. Payer contract terms and conditions can be generated automatically, and pricing committee negotiations can be supported by AI assistants, leading to optimized rebate agreements. Our analysis shows that different pricing use cases in total make up for 4-9% of the AI potential until 2030.

For the sales and commercial function, AI can add value via both revenue and efficiency levers: Virtual sales representatives streamline account management (2-5%), as well as patient segmentation and identification (2-7%). Combined with patient advisory and treatment adherence services (also 2-7%) and automated medical info response generation, revenues can be boosted while saving capacity.

Al supports the sales force significantly: For example, AstraZeneca is showing how Al can be deployed to improve customer service coaching for sales representatives. The AI model builds on AstraZeneca's existing field data to enhance customer interactions.⁶ Veeva's Al-powered CRM platform is used by many pharma companies already - it enables them to deliver autopersonalized marketing and promotional content to healthcare professionals (HCP) efficiently and at scale.⁷ Realizing the AI value potential in commercial will be challenging, not only





because of different market conditions for AI, but also because the ongoing internal data quality issues limit AI use cases. At the same time, the AI use cases disrupt both business and operating models as they change interactions with HCPs and internal processes and will require new skillsets in commercial departments.

Al also plays a pivotal role in reshaping marketing strategies through enhanced customer targeting, personalization and automated content generation, optimized marketing strategies and competitor monitoring, as well as insightful predictive analysis and faster research.

The use cases for business development score better in terms of feasibility and are expected to require fewer internal and external changes. Accordingly, these use cases should be regarded as a priority if relevant. Overall, the AI re-invention of the pharmaceutical commercial domain is quite comparable to other industries' sales functions.

Al value in pharma's enabling functions



Information Technology (IT): IT has a dual role in the AI reinvention. On the one hand, it is the main enabler for the organization to use AI technology in the first place by providing tools, talent, and training. On the other hand, IT capabilities and processes themselves are subject to AI optimization. Two major fields of AI application in IT in our analysis were software development and data engineering. Both are types of expressed, systematic language, that AI can naturally take over at impressive quality and speed. AI as a "copilot" for developers and data engineers can achieve efficiency gains between 10-30% on IT labor costs, enabling IT departments to deliver more output and speed at the same cost.

At the same time, the overall process excellence of IT can be enhanced, for example for bottleneck prediction at operations centers or with highly advanced chatbots for IT service. Mundane tasks like data cataloging or IT asset inventory maintenance can be automated to a large extent. Overall, we expect a share of over 3% of the overall AI potential to come from IT use cases. AI can thus support the CIO in enabling AI success across the organization, especially in times of increased cyber attacks and pressure on IT resilience due to a severe shortage of talent.



Human Resources (HR): Al holds a high potential for HR in almost all areas of the employee lifecycle, especially recruiting, workforce and talent management, and training. The biggest challenge is harnessing this immense power to make processes more efficient and less biased, while preserving the interpersonal element.

In the future, AI will support recruiters to create better job requirements, personalize their reach-outs to candidates based on their preferences, and offer productive and efficient ways to navigate all the incoming profiles. In recruitment, HR staff will be able to invest more time in interpersonal communication, as AI takes over the mundane tagging of skills and experiences from the unstructured data of candidates and other transactional volume drivers. Internally, AI can support with unbiased candidate selection and the onboarding and training of new hires.



In our analysis, experts reviewed 16 use cases, including automated candidate screening and comparison, automated performance evaluation and predictive attrition modeling (summing up to over 0.5% of overall potential).

While this seems low at first sight, the enhanced output, speed, and quality HR can gain has a strategic and transformative importance. Al opens up another hard-to-fill talent gap for pharmaceutical companies, and the existing workforce needs to be trained for Al skills – all of that has to be realized with a next level employee experience to stay competitive. Thus, Al is not only an opportunity for HR to be enhanced, but also a main field to act as an enabler.

Finance: Just like the other corporate functions, finance is both an enabler and profiteer of AI. As an enabler, the CFO has to understand the impact of this technology on the value chain and allocate resources to the most promising projects – including overarching initiatives such as AI copilots. Within the finance organization, AI lets teams automate repetitive tasks, lets them generate complex reports from only a short prompt, as well as it aggregates and analyzes data for them. There are many use cases for the different finance capabilities that are worth considering in this context.

Our experts identified three use cases in particular as especially impactful: Cashflow and liquidity forecasting powered by AI reduces the time spent on manual analysis and optimizes the working capital of the company (3-7% of overall AI potential). Forecasting accuracy is improved by regularly retraining the prediction model from historic patterns. Identification and ranking of critical value drivers can be automated and enhanced with AI. Finance teams can leverage algorithms to swiftly analyze data, identify patterns, and determine which factors influence business outcomes with the highest impact (3-7%). AI chatbots can answer questions about datasets and document libraries, combining and processing data from different sources. Currently, data search and analysis in treasury, accounting and controlling is a largely manual and mundane task. We estimate that using AI chatbots for data searches and analysis in finance can deliver 1-2% of the overall AI potential for pharma companies.

Indeed, we recommend treating the finance function as a focus area for AI among the enabling functions, given that it accounts for 6% of the total AI value potential across the company.

Legal, compliance and ethics, and the internal audit function: More than 20 AI use cases were analyzed in these areas, with significant benefits identified, especially from legal AI use cases that reduced costs and optimized outputs. In total, these remaining AI-enabled functions contribute 0.3% of the overall value potential. One compelling example for many pharmaceutical companies is the generation, validation, and comparison of complex contracts with AI models.







Three steps to overcome challenges and realize AI value

So far, the adoption and exploitation of AI by pharmaceutical companies to realize value lags behind other industries such as financial services and retail, as a Strategy& study in 2023 showed.⁸ Key challenges include:

- The environment of pharmaceutical companies, including their research, development, supply, and healthcare partners holds complex regulative limits, diverse levels of digitization and data availability, and complex datasets and IT systems.
- Rapidly evolving technology and lagging regulatory environments for its application to health- and pharma-related challenges. The recently passed European AI Act is one example of regulation that classifies health-related AI applications as "high risk" and thus raises the bar for realizing value in terms of AI explainability and accountability.

These challenges slowed down adoption in the past – newer and more forward-looking studies suggest that health and pharma are closing the AI value gap in an accelerated way.⁹ Our forthcoming study "Embracing the GenAI Opportunity" highlights how Generative AI gives even inexperienced users access to advanced AI capabilities at scale.¹⁰ As a result, the introduction and adoption of AI across the pharmaceutical value chain will accelerate even stronger.

The overall race to generate value from AI is a marathon stretching over the next decade. Pharmaceutical companies that embark on the AI journey, need to get going and make their AI strategies actionable, overcome data challenges, and seek functional partnerships to deliver first use cases. However, we observe that a major share of the industry has started prioritizing AI use cases. For them, there is a sprint ahead to deliver on the value promise of AI and invest into speed. We identified three critical steps that the most successful pharma AI leaders are executing this year in order to realize the full AI potential:

"

Only a few companies are successful at operationalizing AI at scale. Leaders in the AI space organize for delivery, establish incubators, and measure their value impact."

1 • Organize for AI delivery

Building the right-fit organizational constructs to deliver AI to the business is the key constraint that needs to be overcome by pharmaceutical companies. Vendor-led delivery models have dominated the last years, especially for complex AI products, but have been challenged in-time and on quality. Internal IT-led delivery is becoming more prevalent as many pharma companies build their internal skill sets across cloud services and data science. However, there are substantial challenges across resource quality, skill sets and experience to overcome. Currently, hybrid delivery together with cloud hyperscalers and implementation partners has shown the greatest speed in AI implementation due to the high complexity of many AI use cases. These collaborations allow for the combination of diverse skillsets across the business functions knowledge, software engineering, data science, and product delivery expertise, that all must work in concert.

2 . Establish incubators for innovation

The creation of a mechanism for incubating innovative solutions is separating the AI leaders of tomorrow from the followers. This mechanism is a dedicated team with two main ingredients: The first is a mandate to experiment with rapidly evolving models and adjacent technologies (e.g., LLM-Ops platforms). The goal of this team is not to deliver solutions that assuredly will be adopted or will deliver significant ROI. Their goal is to explore how technology can be applied to business functions, assess whether scale-up is possible, and develop a core 8 organization. The second key ingredient to this incubator is having the right combination of roles and skills across backend and frontend engineering, data science, and product management. Without one of these skillsets, it is a challenge to leverage technology in a way that adds value to the business.

3. Embrace the AI-driven re-invention and lead adoption

As Al solutions are being built, they promise to fundamentally alter the way business functions are executed, simplifying processes, enabling workers to focus on higher-value tasks, and enhancing overall productivity. While these outcomes hold promise for executives seeking cost savings and revenue generation, they also pose challenges in terms of workforce adoption. Employees entrenched in daily operations may harbor resistance and fear towards the impending changes to their roles. Hence, it becomes imperative for organizations to implement top-down communication and upskilling programs that not only explain the forthcoming changes but also highlight the benefits to individual workers, such as engaging in more fulfilling and intellectually stimulating work. Additionally, it is crucial to recognize that solutions only capture value if they are applied. Thus, these top-down programs are essential not just to address worker concerns but also to ensure that the potential benefits (e.g., ROI) of Al are fully realized throughout the organization by upskilling the workforce and ensuring realization of value drivers.

AI drives the convergence of healthcare – Pharma's opportunity for direct value realization

For pharmaceutical companies, it is important to understand that the healthcare ecosystem is currently changing at an accelerated pace, leading to a continued convergence of different healthcare stakeholders. Our research¹¹ shows that the future of pharma and healthcare will be more personalized, digitized and preventive, with solutions seamlessly integrated into daily life. By 2035, two areas of healthcare will converge: wellcare and disease care will become integrated as LIFEcare, enabled by digital technologies. Al will accelerate faster adoption, closer integration, more profitable outcomes for stakeholders and better health for everyone.

Beyond the indirect value potential for pharma companies outlined above, AI has the potential to transform each health industry sector with new AI services for consumers, patients, and healthcare professionals and new market entrants (see *Exhibit 4, next page*):

- Al-powered consumer health solutions enable personal health tracking, virtual clinical trials, and patient monitoring and education through apps, platforms, and devices such as *Whoop*.¹² Al underpins new types of remote health monitoring and support such as *Sense.ly* which offers the virtual Al nurse *Molly* to support patients with chronic conditions.
- Al transforms healthcare processes by reducing administrative and data handling tasks. The average US doctor spends almost nine hours per week on administration,¹³ Al helps to focus on value-adding work, devoting more hours to diagnosis and care.
- Al can outperform humans in pattern recognition for diagnosis and treatment. For example, *PREDICTioN2020* is a clinical decision support tool that lets doctors compare stroke patients' data with simulations.¹⁴ However, our collaboration with the *Osypka* cardiovascular center showed that Al in diagnosis can be subject to bias that needs to be addressed in the future¹⁵.

The broader healthcare ecosystem is changing at an accelerated pace towards AI adoption. Pharma companies can profit directly by deploying AI directly in products and services, e.g., in digital health."

EXHIBIT 4

AI Accelerators for the LIFEcare system



In addition, AI accelerates processes across all healthcare sectors and patient life stages through:

- Unlocking value through more digitized, aggregated and analyzed health data: Generative AI like *BioGPT*¹⁶ can turn unstructured HCP notes into structured datasets, and *Ultivue* with *Aignostics* uses AI to help scientists in navigating proteomics data from genome sequencing.
- Accelerating convergence of industries: *Google* and *Amazon* have invested in the health space for a long time, creating their own care and payor services along the way. Additional to this direct participation their role as technology partners is critical for AI value¹⁷.
- Creating many new partnerships and revenue opportunities: One striking example is *OPTIMA*, a European consortium of university hospitals, research institutes and pharma companies. *OPTIMA* develops clinical AI-based decision support tools in oncology and explores business models for oncology data processing and analysis.¹⁸ More examples can be found in our blog article, "Data and Insights as a Service"¹⁹.
- Improving privacy and anonymizing sensitive data: Software such as *Duality*²⁰ or PwC-backed Statice²¹ helps to anonymize health data more rigorously or make it unnecessary to share personal information at all with innovative concepts like federated training.

Equipped with access to data and stakeholders at several points as well as the more advanced analytical and technical capabilities within this ecosystem, pharmaceutical companies are uniquely suited to extend their role within the Al-driven *LIFEcare* system of the future. The momentum of Al innovation in direct healthcare products and services by pharmaceutical companies is immense. Patent filings involving Al almost doubled in 2023, with *Takeda* being the most prolific applicant since 2020.²² To find out more on how to realize direct Al value, we recommend our "Decode Digital Health" series.²³

The AI race is not only a sprint but also marathon. Both quick wins and long-term AI value realization are possible with precise priorities and bold investments. Pharmaceutical companies should recognize the responsibility they hold both for the competitiveness of their offerings and the immense potential that AI can unleash for human health. The integration of AI technologies into all parts of the pharmaceutical value chain, products, and services can re-invent healthcare and its surrounding ecosystem – pharmaceutical companies have the unprecedented opportunity to lead the way.

"

"Pharmaceutical companies should recognize the immense potential that AI offers and the opportunity for them to lead the way with direct and indirect value realization."

ENDNOTES

- 1. https://www.prnewswire.com/in/news-releases/merck-launches-first-ever-ai-solution-tointegrate-drug-discovery-and-synthesis-302003351.html
- 2. https://www.nature.com/articles/s41586-023-06887-8
- 3. https://www.amgen.com/stories/2022/10/follow-the-data
- 4. https://www.sanofi.com/en/media-room/press-releas es/2023/2023-06-13-12-00-00-2687072
- 5. https://emerj.com/ai-sector-overviews/artificial-intelligence-at-pfizer/
- https://www.fiercepharma.com/marketing/astrazeneca-enlists-artificial-intelligence-forsales-rep-coaching-boost-effectiveness
- https://www.veeva.com/resources/veeva-unveils-vault-crm-next-generation-of-crm-forlife-sciences/
- 8. https://www.strategyand.pwc.com/uk/en/insights/genai.html
- 9. https://doi.org/10.1111/jems.12576
- 10. https://www.strategyand.pwc.com/de/de/presse/2024/generative-ki-kann-bip-heben.html
- 11. https://www.pwc.com/gx/en/issues/transformation/insights/transforming-precisionhealth.html#data-fuels-precision-health-opportunities
- 12. https://www.whoop.com/de/en/thelocker/introducing-whoop-coach-powered-by-openai/
- 13. https://pubmed.ncbi.nlm.nih.gov/25626223/
- 14. https://doi.org/10.1161/STROKEAHA.123.043004; https://doi.org/10.1371/journal. pone.0279088; https://claim.charite.de/en/projekte/previous_projects/prediction2020/
- 15. https://www.pwc.de/de/pressemitteilungen/2023/startschuss-fuer-ki-pilotprojekt-zurfrueherkennung-von-herzinfarkten-bei-frauen.html
- 16. https://pubmed.ncbi.nlm.nih.gov/36156661/
- 17. https://www.umb.edu/news/2020/hey-google-alexa-am-i-at-risk-for-alzheimers/
- 18. https://www.optima-oncology.eu/
- 19. https://www.strategyand.pwc.com/de/en/industries/pharma-life-science/daas.html

- 20. https://dualitytech.com/
- 21. https://www.statice.ai/industries/healthcare
- 22. https://www.pharmaceutical-technology.com/dashboards/patents/patent-activityartificialintelligence-pharmaceutical-industry/?cf-view; https://www.globaldata.com/ marketplace/dataset/globaldata-patents/
- 23. https://www.strategyand.pwc.com/de/en/industries/pharma-life-science/a-practical-experience-based-guide.html



Strategy&

Strategy& is a global strategy consulting business uniquely positioned to help deliver your best future: one that is built on differentiation from the inside out and tailored exactly to you. As part of PwC, every day we're building the winning systems that are at the heart of growth. We combine our powerful foresight with this tangible knowhow, technology, and scale to help you create a better, more transformative strategy from day one.

As the only at-scale strategy business that's part of a global professional services network, we embed our strategy capabilities with frontline teams across PwC to show you where you need to go, the choices you'll need to make to get there, and how to get it right.

The result is an authentic strategy process powerful enough to capture possibility, while pragmatic enough to ensure effective delivery. It's the strategy that gets an organization through the changes of today and drives results that redefine tomorrow. It's the strategy that turns vision into reality. It's strategy, made real.

www.strategyand.pwc.com



Stay up to date – Sign up here to receive the latest Strategy& thought leadership and industry trends

© 2024 PwC. All rights reserved. PwC refers to the PwC network and/or one or more of its member firms, each of which is a separate legal entity. Please see www.pwc.com/structure for further details. Mentions of Strategy& refer to the global team of practical strategists that is integrated within the PwC network of firms. For more about Strategy&, see www.strategyand.pwc.com. No reproduction is permitted in whole or part without written permission of PwC. Disclaimer: This content is for general purposes only, and should not be used as a substitute for consultation with professional advisors.