

# Business Impact of Cloud Adoption in the Life Sciences Industry

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### **EXECUTIVE SUMMARY**

Life sciences organizations are grappling with increased competition and the need to maintain profitability, while navigating a complex regulatory environment. Many are migrating to the cloud to tackle these challenges and to accelerate innovation. The Hackett Group evaluated cloud adoption trends among life sciences organizations, and the resulting business value; the results from this study are presented in this paper.

Quantifiable benefits of moving from on-premises to the cloud were seen across four major themes:

#### Research and discovery

- 31% increase in revenue from new products
- 50% increase in product pipeline throughput
- 33% decrease in unplanned laboratory downtime

#### Clinical development

- 19% reduction in time spent qualifying and initiating trial sites
- 83% increase in employing artificial intelligence (AI) and/or machine learning (ML)
- 20% reduction in time spent analyzing post-trial data

### Commercialization and manufacturing

- 23% decrease in time to ramp up manufacturing
- 45% increase in new products launched on time
- 27% decrease in unexpected manufacturing-related downtime

### Safety and compliance

- 12% increase in GxP audit scores
- 7% reduction in spend to manage adverse events

### **ABOUT THE STUDY**

The Hackett Group conducted a global Industry Cloud Study of 600 organizations across multiple industries in late 2022. Study participants have had cloud-hosted infrastructure for a minimum of one year.

The goal of the research was to assess how a move to the cloud improved operations and business results. The study uncovered the effects of different cloud strategies on key metrics. The Hackett Group also studied how these metrics changed based on different factors, including:

- Number and types of cloud-hosted applications
- Percentage of an organization's infrastructure in the cloud (cloud saturation)
- Cloud spending as a percentage of revenue
- Duration (years) in the cloud

The Hackett Group focused primarily on the biotechnology and medical device industries within the larger life sciences sector (Fig. 1).

### FIG. 1 Life sciences survey respondent's demographics



### **RESEARCH AND DISCOVERY**

Life sciences organizations strive to accelerate innovation to compete in the market and bring new therapies to patients. Typical product development cycles extend over 10 years with less than a 10% rate of success.<sup>1</sup> For each new medicine that reaches the market, companies spend an average capitalized cost of \$3.2 billion, of which more than 50% is for research and development (R&D).<sup>2</sup>

These development programs involve large, disparate data sets that researchers must screen, analyze, and model, for example, to identify therapeutic targets and candidates. Such data sets require significant computing power to analyze and draw insights to establish an effective product pipeline.

Cloud solutions have simplified data management and collaboration through high-performance computing (HPC), facilitating data transfers, and automating manual workflows. These solutions enable organizations to more easily manage data with digital lab notebooks, collect data from diverse lab equipment, integrate data-heavy applications, such as cryogenic electron microscopy (cryo-EM) and genomic sequencing, and automate lab activities between different systems.

These cloud adoption benefits lead to optimized usage of resources and an accelerated product pipeline. After cloud migration, organizations saw a 31% increase in revenue from new products, which equates to approximately \$600 million for a typical organization with \$10 billion in annual revenue. The data showed that organizations steadily improved performance as the duration on the cloud increased (Fig. 2). This is a powerful indicator of continuous improvement to the return on R&D investment through digital transformation.

Cloud duration % change in revenue from		
from new products		
FIG. 2 Cloud duration and percentage change in revenue		

<b>Cloud duration</b> (years since cloud migration)	% change in revenue from new products
1 to 3	26%
4+	34%
All respondents	31%

Source: The Hackett Group 2022 Industry Cloud Study

Several indicators for R&D performance improve with increasing cloud saturation and the migration of HPC applications to the cloud. Organizations with 10 or more applications migrated to cloud observed the highest jump in revenue from new products (Fig. 3).

### FIG. 3 Number of applications migrated and percentage change in revenue from new products

Number of applications migrated	% change in revenue from new products
1 to 3	23%
4 to 9	30%
10+	41%
All respondents	31%

<sup>&</sup>lt;sup>1</sup>"Clinical Development Success Rates and Contributing Factors 2011-2020," Biotechnology Innovation Organization (BIO), Informa Pharma Intelligence and Quantitative Life Sciences (QLS).

<sup>&</sup>lt;sup>2</sup>"R&D Costs of New Medicines: A Landscape Analysis," Steven Simoens and Isabelle Huys, Department of Pharmaceutical and Pharmacological Sciences.

When HPC, or reporting and analytics applications were migrated, product pipeline throughput (the number of products progressing through the development pipeline) saw a 76% increase, compared to 48% when migrating other applications (Fig. 4).

### FIG. 4 Application type and percentage change in product pipeline throughput

Application type	% change in product pipeline throughput
HPC, reporting and analytics	76%
All other applications	48%

Source: The Hackett Group 2022 Industry Cloud Study

Cloud adoption enables the reduction of process inefficiencies and decreases data analysis efforts, resulting in better insights and faster decisions. Cloud tools and platforms also decrease overall clinical trial screening time. Surveyed organizations saw a 50% increase in product pipeline throughput. The improvement is highly correlated with time on the cloud, with a 103% increase in product pipeline throughput for organizations that have hosted workloads on the cloud for seven years or more (**Fig. 5**).

FIG. 5 Cloud duration and percentage change in product pipeline throughput

<b>Cloud duration</b> (years since cloud migration)	% change in product pipeline throughput
1 to 3	17%
4 to 6	50%
7+	103%
All respondents	50%

Source: The Hackett Group 2022 Industry Cloud Study

Cloud services and applications also enhance the efficiency and resilience of R&D activities. This frees up resources and enables organizations to drive additional investments into R&D. Surveyed organizations reported a 4% increase in annual R&D spend as percentage of revenue. The unplanned laboratory downtime decreased by 33%, with an average reduction of 40 hours. Cloud migration helps reduce the full-time equivalents (FTEs) required to manage tactical data by 17%. Organizations also reported a 75% improvement in the ease of matching disparate data sets and realize significant improvements in other critical key performance indicators (KPIs) after cloud migration (Fig. 6). These improvements indicate that cloud platforms help address process inefficiencies, improve revenue generation, and streamline product pipeline throughput.

#### FIG. 6 Additional KPI improvements after cloud migration



### **CLINICAL DEVELOPMENT**

Before market approval, life sciences products typically go through multiple clinical trials that last an average of six to seven years. It is reported that 80% of clinical trials experience delays, at a cost of \$600,000 to \$8 million per day.<sup>3</sup>

Increasingly, organizations turn to AI and/or ML to accelerate clinical trials and bring products to market faster. For example, AI and/or ML can be applied to process large and unstructured data sets to identify patient populations, screen and select trial sites, design protocols, and analyze and visualize trial data in real time.

Cloud enables clinical teams to collaborate across different geographic locations and helps streamline the workflow. In this study, organizations report a 19% reduction in the time it takes to qualify and initiate trial sites after cloud migration. Organizations that have migrated more applications to the cloud see a more drastic reduction; for example, those that migrated seven or more applications reduced their time to qualify and initiate trial sites by 27%, or 29 days saved per trial (**Fig. 7**).

FIG. 7 Number of applications migrated to the cloud, and percentage change in time to qualify and initiate trial sites

Number of applications migrated	% change in time to qualify and initiate trial sites
1 to 3	-9%
4 to 6	-16%
7+	-27%
All respondents	-19%

Source: The Hackett Group 2022 Industry Cloud Study

After cloud adoption, organizations reported a 34% increase in the terabytes of data processed per day. Additionally, respondents reported a 20% reduction in the time spent on data analysis once trial data collection is completed. Surveyed organizations reported an 83% increase in the use of AI and/or ML in clinical trials after cloud migration. This was especially

higher for companies that were spending more on cloud as a percentage of revenue (Fig. 8). Similarly, companies that migrated seven or more applications or 75% or more of their workloads experienced 2X the increase in the use of AI and/or ML (Fig. 9).

Cloud spend as % of revenue	% change in trials employing Al and/or ML
< 1%	79%
1% to 1.99%	85%

### FIG. 8 Cloud spend, and percentage change in trials employing Al and/or $\rm ML$

2%+	88%
All respondents	83%

Source: The Hackett Group 2022 Industry Cloud Study

### FIG. 9 Applications migrated to the cloud, and percentage change in trials employing Al and/or ML

Number of applications migrated	% change in trials employing Al and/or ML
< 7	63%
7+	120%
All respondents	83%
Cloud saturation	% change in trials employing Al and/or ML
Cloud saturation < 75%	% change in trials employing Al and/or ML 70%
Cloud saturation < 75% 75%+	% change in trials employing Al and/or ML 70% 2X 140% ↓

Source: The Hackett Group 2022 Industry Cloud Study

With AI and/or ML organizations can build scalable enterprise search tools that provide predictive analytics and organize important documents, knowledge, and data in one centralized location. Further, AI and/or ML enable advanced analytics that can be used to match participants to studies. These technologies may also be used to improve digital data extraction and computational phenotyping.

<sup>3</sup>"Clinical Trials and Their Patients: The Rising Costs and How to Stem the Loss," Pharmafile.

For example, a North American clinical research software provider developed a cloud-based platform that enables data management across the clinical trials process, with self-service analytics and visualization features to support research needs. Using AI and/or ML technologies, this platform identified predictive risk factors for early diagnosis, and transformed data to rapidly assess and categorize patients based on their risk profiles. This demonstrated a 90% accuracy rate in predicting certain medical conditions one year in advance.

#### COMMERCIALIZATION AND MANUFACTURING

Manufacturing resilience is critical to life sciences companies as they strive to meet strict regulations and operational standards. Unexpected manufacturing and IT downtime can cost millions of dollars per day in decreased yields, lost revenue, regulatory fines, compromised quality, or damage to reputation.

The study found that cloud adoption contributed toward a reduction in unexpected manufacturingrelated downtime of 27%, or an average of six days saved per year (Fig. 10). The increase in uptime can lead toward an improvement of approximately \$50 million in margin for a typical organization with \$10 billion in annual revenue.

### FIG. 10 Reduction in annual unexpected downtime after cloud migration



Source: The Hackett Group 2022 Industry Cloud Study

Organizations also reported a 23% reduction or three fewer days in the time it takes them to set up their production lines to manufacture new products (Fig. 11). This represents savings of approximately \$87 million for a typical organization with \$10 billion in annual revenue. Additionally, the study reflected a 17% increase in product batches delivered on time in full (OTIF). These improvements highlight how much modern digital technologies are revolutionizing manufacturing operations. Al and/or ML provide manufacturers with better tools and insights to improve their production operations. After cloud migration, reductions in unexpected downtime have significant impacts in the improvement of product speed to market.

#### FIG. 11 Manufacturing optimization after cloud migration

Faster time to ramp up manufacturing	23%
	170/
Increase in product batches delivered OTIF	17%

Source: The Hackett Group 2022 Industry Cloud Study

The migration of business applications to the cloud results in several improvements. For instance, companies that migrated seven or more applications to the cloud reported a 29% reduction in unexpected IT-related downtime from outages, compared to organizations that migrated fewer applications and reported a 22% reduction in unexpected IT downtime (Fig. 12). In 2022, the average IT downtime for a single outage was 78 minutes, at a cost averaging \$88,000 per hour.<sup>4</sup>

## FIG. 12 Number of applications migrated to the cloud and percentage change in downtime due to unexpected IT outages

Number of applications migrated	% change in downtime due to IT outages
1 to 6	-22%
7+	-29%
All respondents	-26%

Timely launches of new products are critical to the growth and success of life sciences organizations. Delays in product launches can result in missed revenue targets, increased operational costs, and losses in market share. Further, this may negatively impact an organization's reputation and hurt investor confidence.

The study found a 45% increase in the number of new products launched on time after cloud migration. This increased further when specific types of applications were migrated. For instance, organizations migrating their business applications, such as enterprise resource planning (ERP), reported a 60% increase in the number of new products launched on time. The largest improvement of a 191% increase in new products launched on time was reported by organizations that migrated their industry-specific niche applications, such as those used for clinical research, drug discovery or lab management (Fig. 13).

### FIG. 13 Application type migrated and percentage change in new products launched on time

Application type	% change in new products launched on time
Industry-specific niche applications	191%
R&D, product engineering	66%
High-performance computing (HPC)	62%
Enterprise resource planning (ERP)	60%
All other applications	42%
All respondents	45%

Source: The Hackett Group 2022 Industry Cloud Study

Cloud tools enable better analytics and insights to proactively address manufacturing issues, leading to fewer defects and improved product quality, improving the yield rate by 19%. They also provide better quality control over manufacturing, with a 21% reduction in FTEs required to test batch stability (Fig. 14). This increases by eight percentage points with seven or more years in the cloud.

### FIG. 14 Cloud duration and percentage change in FTEs required to test batch stability

Cloud duration (years since cloud migration)	% change in FTEs required to test batch stability
1 to 3	-16%
4 to 6	-22%
7+	-29%
All respondents	-21%

Source: The Hackett Group 2022 Industry Cloud Study

### SAFETY AND COMPLIANCE

Organizations are turning to the cloud to understand, accelerate, and streamline their regulatory submission and compliance processes. Surveyed organizations experienced a 12% increase in GxP audit scores. Among those, clinical trial organizations reported a 17% increase in GXP audit scores. GxP compliance ensures that life sciences organizations' processes meet strict quality and compliance standards.

Additionally, organizations reported increased efficiency in their security and regulatory compliance processes. For example, organizations that migrated to the cloud reported that their security operations costs have stayed flat (Fig. 15). This is in major contrast to the broader industry where security operations costs have risen sharply over the years, causing operations management to allocate a higher portion of their spending on securing their data and systems.





The cloud helps organizations streamline and scale adverse event reporting while generating efficiencies and cost savings. Organizations reported a 7% reduction in spend on pharmacovigilance, such as for managing adverse drug reactions (ADRs). Organizations that stay in the cloud longer gain improved control over their adverse event management processes. This enables organizations to swiftly detect and address issues using advanced cloud-enabled analytical tools, leading to cost reductions (Fig. 16).

### FIG. 16 Cloud duration and percentage increase in spend savings to manage adverse events

<b>Cloud duration</b> (years since cloud migration)	% savings in spend to manage adverse events
1 to 3	3%
4+	7%
All respondents	7%

Source: The Hackett Group 2022 Industry Cloud Study

#### **CREATING A BLUEPRINT FOR SUCCESS**

Cloud adoption is foundational to an organization's digital transformation. Digital World Class<sup>™</sup> organizations clearly define their cloud strategy and manage their cloud footprint actively to realize the benefits discussed in this paper.

The study looked at the following migration approaches adopted by life sciences organizations to understand how they impacted business operations:

- Rehost
- Replatform
- Rearchitect
- Retire
- Repurchase

All migration approaches improved KPIs for organizations, however, the study found that 59% of the KPIs evaluated saw above-average improvements when life sciences organizations chose a replatform approach to cloud migration. Replatform involves migrating on-premises applications to the cloud, and then applying optimizations to take advantage of cloud capabilities. The combination of rearchitect and replatform is the leading combination of percent improvement of all KPIs (Fig. 17).





**Replatform:** Migrating on-premises applications to the cloud, and then applying optimizations to take advantage of cloud capabilities.

**Rearchitect:** Redesigning on-premises applications by using cloud-native features to improve performance, and then deploying to the cloud.

Source: The Hackett Group 2022 Industry Cloud Study

Similar to cloud migration approaches mentioned above, the study also focused on the following strategies employed by the study respondents to modernize their workloads and create more efficiencies:

- Serverless computing
- Containers
- Managed data and analytics
- DevOps

Of these different modernization strategies, the study found that the adoption of managed data and analytics platforms helped organizations realize improvements across the most number of KPIs. Organizations that adopted managed data and analytics platforms realized a higher level of improvement compared to the rest of the population for 77% of the KPIs (Fig. 18). This is especially remarkable since 78% of the organizations surveyed reported using this strategy.

#### FIG. 18 Modernization strategies



**Containers** are a standard unit of software that packages up code and all its dependencies, enabling the application to run quickly and reliably from one computing environment to another.

Serverless computing is a cloud-based service where the cloud provider dynamically allocates resources needed to execute application code. The cloud provider manages all the infrastructure, which means that the application teams only need to write code.

**DevOps** increases an organization's ability to deliver applications and services at a faster pace than organizations using traditional software development and infrastructure management processes. This speed enables organizations to better serve their customers and compete more effectively in the market.

Managed data and/or analytics refers to database services built and accessed through your cloud provider's platform. A cloud database enables companies to host databases without buying dedicated hardware. Cloud databases support both relational and nonrelational databases.

Source: The Hackett Group 2022 Industry Cloud Study

Companies that adopted all four modernization strategies reported the highest percent of KPIs that improved compared to the KPI average improvement, as well as showing the highest average improvement (Fig. 19).

FIG. 19 Percentage of KPIs above average by number of modernization strategies adopted



Source: The Hackett Group 2022 Industry Cloud Study

### RECOMMENDATIONS

Life sciences organizations are constantly looking to innovate and improve across their value chains in the face of an increasingly competitive and highly regulated landscape. The adoption of cloud platforms and capabilities enables several important benefits across the value chain, as observed from the improvements to the KPIs evaluated in this study. How an organization realizes these benefits is dependent on their cloud approach, migration journey and the specific strategies they adopt to modernize their applications and workloads.

The study uncovered several improvement opportunities and benefits enabled by cloud solutions. To realize these benefits, organizations should:

- Fund cloud projects to increase scientific innovation and to boost IP development. Organizations can achieve a 31% increase in revenue from new products and accelerate product pipeline throughput by 50%.
- Invest in AI and/or ML cloud digital capabilities to reduce ramp-up time for manufacturing, increase new products launched on time, and increase revenue from new products.
- Sponsor cloud projects that build scalable enterprise search tools, and leverage these to provide predictive analytics and improve collaboration.
- Turn to cloud solutions to understand, accelerate, and streamline the regulatory submission process and de-risk portfolios by quickly identifying viable target modules using on-demand, cost-effective, HPC power.
- Emphasize cloud saturation as a key factor to win in the marketplace. Not every organization is ready to mass migrate their workloads, but many do want to achieve a higher velocity of innovation. The study shows after migration business agility improvements for all organizations. However, top performers are those with higher cloud saturation levels.

### About the Advisors



### **PREM PURUSHOTHAMRAJ**

Director, Technology Benchmarking and Advisory

Mr. Purushothamraj works with leaders across industries to help them realize business value from their investments in digital transformation. He has over 16 years of management consulting and technology transformation experience, and has managed delivery of digital transformation programs across functional teams. He has hands-on experience in delivering current-state assessments and transformation efforts for technology organizations to improve their overall performance, and execution of their digital strategies.



### TADA YAMAMOTO

Director, Strategy and Business Transformation

Mr. Yamamoto has served numerous global industrial manufacturing clients in operations, sourcing and procurement. He is a Six Sigma Black Belt and has applied his knowledge to leading projects across heavy machinery manufacturing and IT call center optimizations. Mr. Yamamoto has also developed should-cost models for multiple clients, including automotive OEMs, that contributed to double-digit percentage reductions in sourcing costs.



#### JOHN VAN DECKER

Associate Principal, Vice President, Chief Research Officer

Mr. Van Decker sets the vision for the research program at The Hackett Group. He has over 35 years of experience as an industry analyst, CIO, software strategy leader, business/IT consultant and finance/sales operations end-user. Mr. Van Decker has spent 17 years prior to joining Hackett as a leading ERP and financial management IT industry analyst, where he has worked with thousands of customers concerning their IT and business strategies.

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