

ARCONDIS INSIGHTS

Overcoming Barriers to Life Sciences

Part 2: Research & Development

This is the second article in our **life sciences** insights series, exploring the R&D stage of the value chain and the key challenges organisations face to achieve R&D productivity by overcoming barriers to succeed in life sciences innovation.



The R&D Productivity Paradox in Life Sciences

The life sciences industry has entered one of the most scientifically promising periods in its history. Advances in genomics, precision medicine, artificial intelligence and cell and gene therapies are reshaping how diseases are understood and treated. At the same time, organisations are under increasing pressure to accelerate innovation, reduce development timelines and deliver new therapies to patients faster than ever before.^{1,2}

Despite rapid scientific and technological progress, many organisations continue to struggle to translate innovation into proportional gains in R&D productivity. This reflects a growing paradox in life sciences: labs are generating more data, adopting more advanced technologies, and operating with deeper specialisation than ever before, while overall R&D productivity lags, and often remains under pressure. Increasingly, the challenge is not data generation itself, but the ability to connect, operationalise, and scale scientific knowledge across the laboratory ecosystem. In many organisations, the laboratory has become data-rich but insight-constrained.^{2,3}

Data Fragmentation Has Become a Structural Barrier to R&D Productivity

A central driver of persistent R&D productivity challenges is not purely scientific, but structural. Modern labs operate within increasingly complex digital environments, where experimental data, analytical results and operational information are distributed across ELNs, LIMS platforms, scientific instruments, enterprise applications and external partner platforms.^{3,4}

While these systems often perform their individual functions effectively, they rarely operate as a fully integrated ecosystem and are often completely disconnected from each other. The result





is a fragmented laboratory data landscape that creates significant operational inefficiencies and hinders scientific collaboration.^{3,4} Scientists spend substantial time on data handling, documentation, and administrative activities rather than on scientific experimentation and analysis. Experimental context is frequently lost as information moves between systems, workflows become fragmented across platforms and organisational boundaries, and valuable scientific knowledge remains trapped within data silos.³ These challenges not only reduce operational efficiency but also limit reproducibility, slow decision-making and constrain the organisation's ability to leverage advanced analytics and AI at scale.⁵

The FAIR data principles provide a valuable framework for advancing scientific interoperability. However, many lab environments still lack the standardised data structures, governance models, and interconnected workflows required to translate these principles into scalable practice.⁶ The implications extend far beyond operational inefficiency.

Fragmented lab environments hinder decision-making, reduce reproducibility, complicate

regulatory compliance, and restrict the ability to scale advanced analytics and AI capabilities.^{5,6} As a result, many organisations find themselves attempting to build next-generation digital capabilities on top of fragmented legacy data architectures, inadvertently creating a fundamental disconnect between technological ambition and data readiness.^{4,5}

From Data Generation to Decision Velocity: The New R&D Constraint

Competitive advantage in R&D is increasingly shifting from data generation to decision velocity, the ability to transform lab data into reliable scientific insight and act on it quickly.^{3,5}

Still, many organisations continue to struggle to convert growing volumes of scientific data into timely, actionable decisions. As data complexity increases, scientific teams face mounting challenges in integrating information across workflows, contextualising findings, and translating insights into operational outcomes.³

The result is a widening gap between data generation and decision-making. Delayed or fragment-

ed decisions not only slow scientific progress but also increase development costs, reduce organisational agility, and hinder the effective allocation of resources and investment.^{1,5}

In response, many organisations have invested heavily in cloud platforms, advanced analytics, and AI-driven capabilities. However, these technologies often fail to deliver their full potential because the underlying scientific data and workflows remain disconnected across systems, teams, and functions.^{3,5} As a result, even the most advanced AI models are limited by incomplete, inconsistent, or poorly contextualised data. Without a connected and trusted data foundation, organisations risk scaling technology investments without realising corresponding gains in scientific productivity or decision quality.⁵

R&D Talent Models Are Not Evolving Fast Enough

In parallel with technology and process challenges, R&D organisations are facing increasing talent constraints. The growing convergence of laboratory science, data engineering, automation and AI is driving demand for interdisciplinary skill sets that remain difficult to source, integrate and scale.^{3,7}

Many organisations report shortages in critical areas such as bioinformatics, data science, laboratory informatics, AI engineering and advanced therapeutic development. These gaps slow the adoption of digital technologies and limit the ability to operationalise more data-driven R&D models.^{3,7}

However, the challenge extends beyond technical skills alone. Many organisations underestimate the behavioural changes required to embed new digital tools, workflows, and ways of working within lab environments.^{3,4}

Successful transformation requires new operating models, stronger cross-functional collaboration and tighter alignment between scientific and digital teams. Without these enabling capa-

bilities, technology investments alone are unlikely to translate into sustained productivity improvements.⁴ As a result, future-ready R&D organisations will increasingly rely on hybrid talent models that integrate deep scientific expertise with digital, engineering and data capabilities, and supported by structures that enable effective collaboration across disciplines.^{4,7}

Conclusion: Scientific Intelligence Will Define the Future of R&D

To remain competitive, life sciences organisations must fundamentally rethink how R&D operates across people, processes, technology and data.

Future R&D performance will depend less on data volume or isolated technology investments, and more on how effectively organisations connect laboratory operations, scientific data, workflows and decision-making across the broader R&D ecosystem.

This shift requires interoperable lab system architecture, connected data foundations and integrated operating models capable of scaling scientific insight across the enterprise.

Organisations that succeed in this transformation will accelerate discovery, improve reproducibility and shorten development timelines. Moreover, they will allocate R&D investments more effectively across increasingly complex portfolios and will ultimately deliver innovation to patients faster. In this context, future R&D leaders will be defined by their ability to transform laboratory data into scalable scientific intelligence at speed and at scale.

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How Arcondis Helps

Translating R&D Complexity into Strategic Action

Scientific innovation and new technologies are advancing quickly, and many R&D organisations struggle to turn this progress into real, measurable results. To improve productivity, companies need better ways to connect data, workflows, technology and scientific expertise across the laboratory environment.

At Arcondis, we help life sciences organisations turn these challenges into practical, results-driven improvements.

Building a Strong Data Foundation for Better Decisions

Data is often spread across different systems and stages of research, making it hard to see the full picture and slowing down decision-making. Arcondis helps connect laboratory systems, data platforms and workflows to improve data access and ensure more consistent and reliable information across R&D teams.

Using Advanced Analytics to Turn Data into Insights

Advanced analytics and AI are changing how organisations work with scientific data. They help teams move from raw data to clear, usable insights faster.

Arcondis supports companies in embedding these tools into R&D processes from early discovery to clinical development, to speed up insights, improve decision-making and increase efficiency.

Building Skills for Modern, Digital R&D

As labs become more digital and data-driven, organisations need teams with a mix of scientific, digital and technical skills. Arcondis helps build these cross-functional capabilities by combining



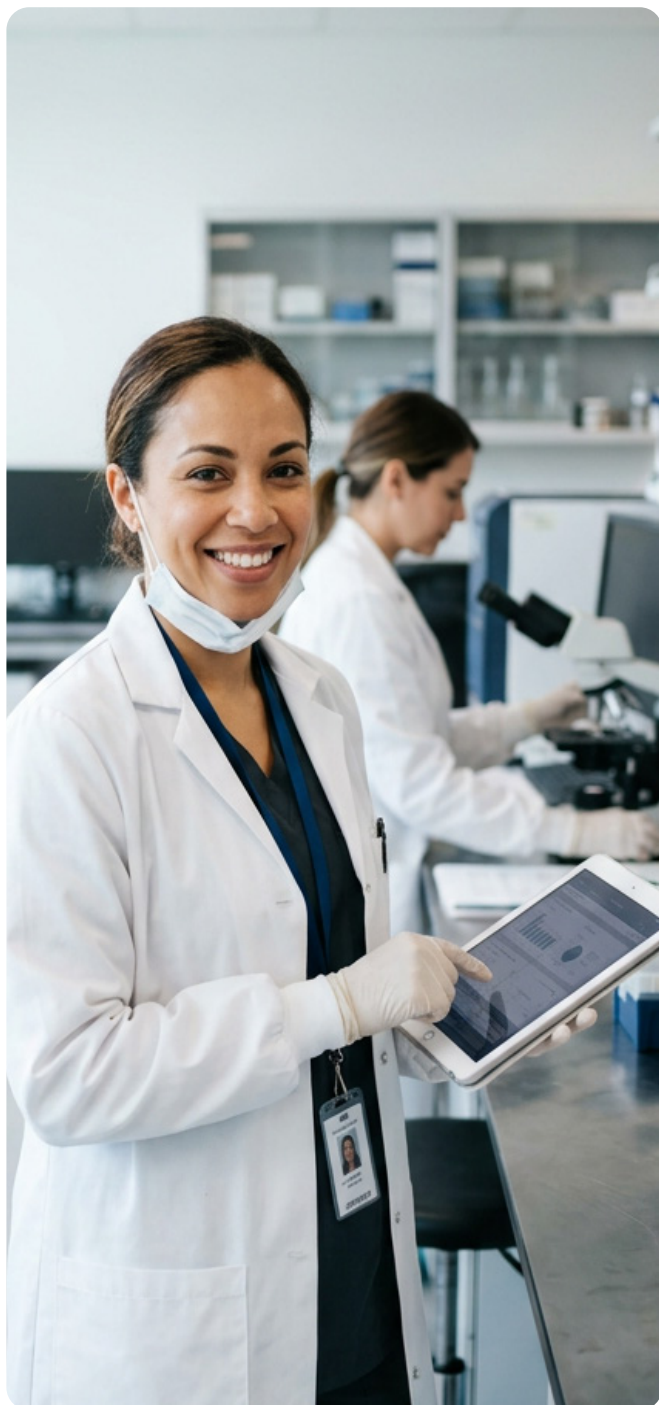
expertise in life sciences, digital transformation, compliance, and process improvement. This helps organisations adapt more easily and drive long-term change.

Improving R&D Workflows for Faster Execution

Many R&D processes are still manual and fragmented, which slows down work and delays decisions. Arcondis helps organisations simplify and automate workflows while aligning technology with real scientific and operational needs. This improves efficiency, speeds up execution and allows R&D teams to focus more on innovation and science.

Turning Complexity into a Competitive Advantage

By improving data foundations, analytics, skills, and workflows with strong governance and collaboration, life sciences organisations can significantly boost effectiveness in their complex R&D ecosystems. This leads to faster innovation, better control of cost and risk, and ultimately more value for patients and stakeholders.



Client Case Study

From Fragmentation to a Digital, Connected Laboratory Environment

Global organisations establishing new R&D centres are increasingly aiming to modernise lab operations through digital tools and data-driven ways of working. However, they often continue to face manual workflows, fragmented data flows, limited alignment between scientific users and IT and inconsistent adoption of data best practices, which constrain efficiency and scalability.

In one case, a leading organisation setting up a new R&D lab centre designed a fully digital lab environment to enable scientists to work in a more connected and modern way. Arcondis supported this initiative, which focused on digitising end-to-end laboratory processes, automating and connecting laboratory instruments, implementing FAIR data principles and eliminating data silos and scientific workarounds, supported by targeted change management to drive adoption of new ways of working.

The transformation resulted in a fully digital and more collaborative lab environment, enabling automated instrument-to-ELN data flows, improved data quality and FAIR data adoption, and significantly increased R&D efficiency alongside stronger compliance with data and organizational standards.

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Connect with Our Experts

Turning complexity into advantage requires the right perspectives and experience. If you would like to discuss how these challenges apply to your organisation, our experts are available to share insights and explore potential approaches.

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