

Laboratory software

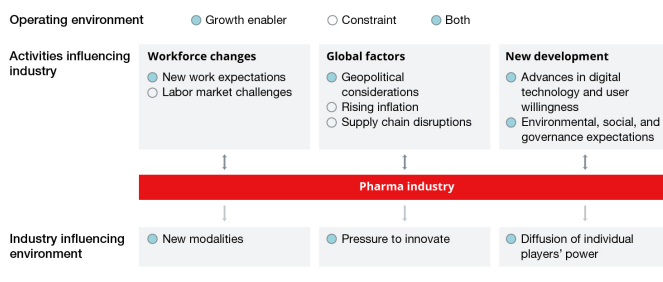
# Accelerating science and driving productivity

## Understanding digital laboratory orchestration

### Introduction

The pharma industry is facing a complex array of dynamic forces – changes in health economics, scarce expensive talent, persistently high inflation, supply chain volatility, and fluctuating population and patient dynamics are just some of the things leading to challenging operating conditions. Virtually every pharmaceutical company has recognized that the introduction of digital technologies can help in addressing and in some cases mitigating these complex forces. CIOs and newly anointed Digital Leaders are partnering closely with their business partners and functional leaders to rapidly adopt technologies - developing proofs of concept for new modalities to interact with partners, supply chains, regulators, health networks, providers, and even some consumers and patients. Newly installed Digital Leaders are being given the remit and are earning the credibility to initiate digital transformation activities through which technology-enabled and analytics-rich programs can accelerate drug discovery, device development, diagnostics, remote clinical trials, and new methods of patient engagement.

The pharma industry is facing a complex network of forces.



Source: McKinsey&Company – Emerging from Disruption the Future of Pharma Operations Strategy<sup>1</sup>

Life Science CIOs expect their budgets to continue rising in support of Digital Transformation, in 2023 the average change in budget was +4%.<sup>2</sup> These budgets are being invested in the implementation of key technologies that enable organizations to reach their desired business outcomes (i.e., faster drug development, more efficient operational processes, optimized customer experience, and increased quality standards). Digital Leaders have been brought into businesses to ensure the connection to business outcomes and avoid the historical mistake of decisions being made with too much of a technical bias. The highest priority technology investments include artificial intelligence/machine learning, automation, integration technologies, cloud, and data analytics/business intelligence. According to a recent study of over 200 global pharma respondents by the Pistoia Alliance, over 60% recorded that AI/ML will be the top technology investment over the next two years. Respondents stated that they see low quality and poorly curated datasets as the biggest barrier to implementing AI.<sup>3</sup> This same barrier was also described by Amgen in an article published in Nature, the largest barrier to effective use of AI being the quality and quantity of datasets.<sup>4</sup>

Steering an organization through this digital transformation requires Digital Leaders to confront a set of new realities for managing a rapidly changing operating model and organization. Harnessing the sheer amount of data and forming the connections across both internal and external parties will require new levels of interoperability. Most technical infrastructures will also need to support more resilient, dynamic, and agile organizations that can rapidly compose new digital experiences, more complex data connections and greater collaborations across internal and even external partnerships.

As part of our mission to be the World Leader in Serving Science, Thermo Fisher Scientific is dedicated to developing new industry leading, scalable digital solutions and creating long standing partnerships with our customers that propel these new innovations and expectations forward.

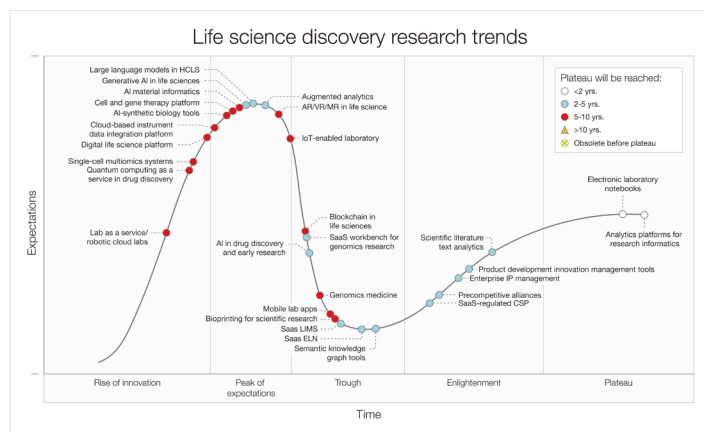
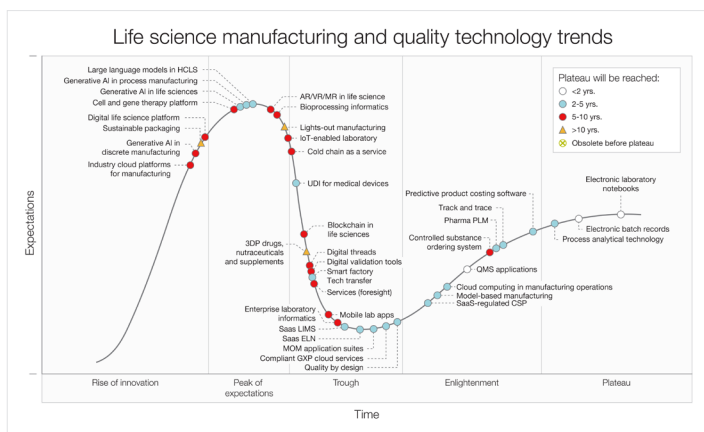
### Rethinking operating models – digital laboratory orchestration

Leading analyst firms such as Gartner, McKinsey&Company, and Boston Consulting Group (BCG) have discussed that one of the top ongoing transformation priorities is the creation of digital ecosystems and partnerships centered around a digital life science platform.<sup>5</sup>

### What is a digital life science platform?

A digital life science platform is an architectural approach that enables companies to nimbly adapt their businesses and operating model in response to external disruption and change in business strategy. To maximize the outputs from legacy applications and provide a new mechanism for digital scalability, the orchestration platform integrates with and does not replace existing IT investments or legacy systems which are often deeply embedded in work practices. The platform aims to provide a common data layer that sources and integrates functionality from internal and external applications - enabling the seamless use of artificial intelligence and data mining. Together, this provides the most technologically efficient and cost-effective approach to scaling digital capabilities. This architectural approach has been outlined by organizations such as Gartner and ASTM International – Standard Guide for Laboratory Informatics, 2019.<sup>6</sup>

Gartner’s Hype Cycle’s for both Life Science Discovery and Manufacturing list that a DLSP’ architectural approach provides transformational benefits to organizations that introduce this technology.



## What is the business impact of deploying a digital life science platform (DLSP)?

The business impact of a digital life science platform largely falls into two categories: Accelerating Science (R&D) and Driving Productivity (Manufacturing/QAQC). By deploying a DLSP within R&D and/or manufacturing the benefits seen below come together to push science forward and increase the efficiency of operations.<sup>7</sup>

Tangible results from these types of programs are now beginning to flow through, life science companies have begun to see these benefits in action and are starting to capture value from digital and analytics but are still scratching the surface.

**Life Sciences Data and Analytics leaders estimate that digital and analytics drove a 5 to 15% bottom line improvement in specific functional areas, yielding an annual global impact of \$6 billion to \$9 billion.<sup>8</sup>**

This compares with an estimated \$130 billion to \$190 billion that the full application of digital solutions and innovation along the life sciences value chain could bring. Pfizer, famously, demonstrated how digitally powered tech transfer during COVID-19 production could drastically improve operational efficiency, product quality, and time-to-market.

## Accelerating science and driving productivity

	From	→	To
Management	<b>Operating model</b>	<ul style="list-style-type: none"> <li>Reactive</li> <li>Focused on optimization</li> <li>Traditional hub center on originators</li> </ul>	<ul style="list-style-type: none"> <li>Proactive</li> <li>Focus on innovation to support optimization</li> <li>End to End ecosystem of partners centered around an orchestration platform</li> </ul>
	<b>Productivity and overhead</b>	<ul style="list-style-type: none"> <li>Overstretched</li> <li>Management of many vendors</li> <li>Inefficient mechanisms to make informed decisions or review science leading to redundant experiments, slowed manufacturing</li> </ul>	<ul style="list-style-type: none"> <li>Reduction in vendor management costs by 10% or more</li> <li>Seamless flow of information</li> <li>Efficient experiment design, improved quality and production times</li> </ul>
IT	<b>Enterprise: network, information and IT</b>	<ul style="list-style-type: none"> <li>Solving for cost-reactive and firefighting</li> <li>Data sits in silos -limited data exchange</li> <li>Limited use of 3rd party applications - associated with high costs</li> </ul>	<ul style="list-style-type: none"> <li>Solving for multiple variables via composable architectures</li> <li>Data interoperability and liquidity</li> <li>IT ecosystem digitization</li> <li>Powered by API economy + cloud first</li> </ul>
Therapeutics	<b>Laboratory</b>	<ul style="list-style-type: none"> <li>Disjointed digital experience</li> <li>Science by trial and error</li> <li>Drug product focused</li> <li>One-to-many approaches</li> </ul>	<ul style="list-style-type: none"> <li>Fully scaled ecosystem</li> <li>Harmonized data to enable use of advanced analytics (AI/ML), visualization</li> <li>Informed <i>in-silico</i> experimentation</li> <li>Therapies delivered by all avenues</li> <li>Precision modalities, targeted patients</li> </ul>
	<b>Manufacturing</b>	<ul style="list-style-type: none"> <li>Manual operations that are challenging to adopt to new products</li> <li>Fluctuating lead times</li> <li>Difficulty balancing production lines</li> <li>Wasted material consumption and equipment utilization</li> </ul>	<ul style="list-style-type: none"> <li>Improved lead times</li> <li>Increased efficiency</li> <li>Waste reduction</li> <li>Increased quality</li> </ul>
	<b>Lab workforce</b>	<ul style="list-style-type: none"> <li>Disconnected employees with poor access to insights</li> <li>Project-focused teams</li> <li>Poor collaboration</li> </ul>	<ul style="list-style-type: none"> <li>Positive digital experiences + high digital literacy rate</li> <li>Product focused teams</li> <li>Improved communication and collaboration</li> </ul>

## Platform based lab orchestration – creating a digital thread from research to manufacturing

Connecting the transfer of knowledge and data from research to development to manufacturing has become a digital north star for life science organizations – unlocking meaningful access to data and generating a dependable mechanism to make informed critical decisions.<sup>9</sup> As a drug target transitions from discovery to proof-of-concept to becoming a manufactured drug, the establishment of a digital life science platform provides the framework to create connected digital threads of knowledge along the value chain. This has the potential to transform the life sciences industry by holistically managing the drug development process in a digital context; as well as automating operational functions within the physical laboratory such as consumable and reagent procurement, asset and fleet management, resourcing, and scheduling.

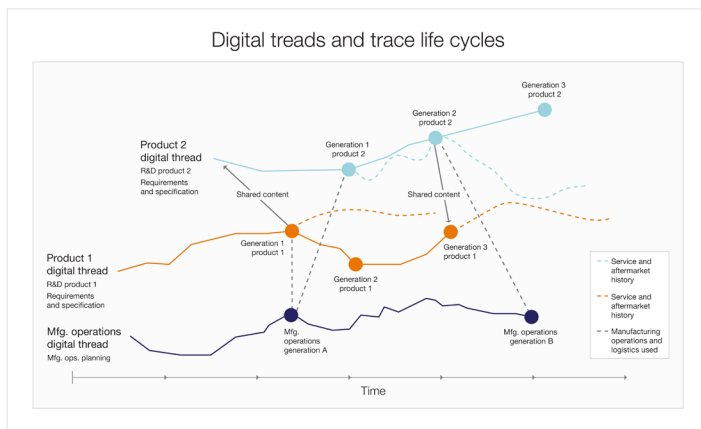
Gartner has discussed the tremendous value of establishing a digital thread within the context of tech transfer to manufacturing. By applying this concept across the entire drug life cycle there is incredible value to be generated.<sup>10</sup> The traceability inherent to digital threads makes compliance more manageable for regulated products produced in high-volume such as vaccines, small and large molecule therapeutics, and consumables.

At the content level, product digital threads provide a richer understanding of how and why product and process content evolves and reaches its current state by connecting data from multiple sources. They also enhance traceability for managing the detailed convergence of multiple processes and workflows.

At the executive level, a complete view of life cycle costs is established, by connecting R&D and engineering costs, production costs, supplier qualifications, cost of procurement, cost of quality (including cost of poor quality and noncompliance), and cost of service. This disintermediates any inconsistencies and reduces profit loss. Additionally, insights and decision making are improved by empowering the use of advanced analytics, AI/ML across a product's life cycle.

## Modern innovation – building specialized partnerships to create innovation at scale

As big Pharma seeks to unlock the value of Big Data in both the acceleration of science and in efforts to drive productivity, it has recognized the part that Big Tech can play in that mix. By combining the domain expertise of the scientific supply companies such as Thermo Fisher with the dedicated and scaled technical platforms that are available from organizations such as Amazon AWS and Microsoft Azure, new opportunities and capabilities to innovate arise.



## Conclusion

The mechanisms to conduct research and development across industries are rapidly evolving and thus, the architectural and collaborative approach to laboratory informatics has shifted to promote agility, flexibility, and compliance within the laboratory. Relationships between Pharma companies and their suppliers are shifting, simple transactional engagements of 'off the shelf' products are being replaced by carefully curated partnership engagements with long term horizons, well mapped benefits and an array of participants from various parts of the ecosystem to support scale ambitions. Orchestration via a digital life science platform provides a connected architecture to accelerate science in discovery and development laboratories and drive productivity in manufacturing and supply chain settings. Taken together, a completely digitalized thread of data and knowledge can be seamlessly established throughout the drug discovery and development life cycle.

As organizations attempt to accelerate their digital transformation journey through leapfrog digital innovation, they should consider:

1. Developing a long-term organizational partnership to help drive and implement a long-term informatics strategy with an industry leader such as Thermo Fisher.
2. Creating a purposeful portfolio of digital innovation that cohesively builds on one another to reach full digital potential with scaled partners who can support that vision.
3. Designing an operating model that provides dedicated innovation resources to support desired business outcomes.
4. Implementing change management procedures to ensure the success of digital transformation efforts.

## Why choose Thermo Fisher as your strategic digital transformation partner?

Ensuring our customers have a best-in-class customer experience is at the heart of what we do. We provide industry leading solutions across our customers' entire organization- from lab consumables, instrumentation and software to viral vector production and clinical research. Most importantly we utilize the domain expertise that we have across our 100,000 colleagues to ensure that best practices are instilled in all our offerings. Thermo Fisher is a trusted brand across the laboratory due to our rigor in scientific practices, dedication to quality, and our focus on customer satisfaction. We are more than a software provider, we are your partner in serving science and making the world healthier, cleaner and safer.

## References

1. Dukart, Hillary, et al. "Emerging from Disruption: The Future of Pharma Operations Strategy." *McKinsey & Company*, 10 Oct. 2022, [www.mckinsey.com/capabilities/operations/our-insights/emerging-from-disruption-the-future-of-pharma-operations-strategy](https://www.mckinsey.com/capabilities/operations/our-insights/emerging-from-disruption-the-future-of-pharma-operations-strategy).
2. Gandhi, Animesh. "2023 CIO and Technology Executive Agenda", *Gartner*, 3 June 2022, <https://www.ciodive.com/spons/2022-cio-priorities/624672/>.
3. "Lab of the Future Report 2023." Pistoia Alliance, 18 Sept. 2023, [www.pistoiaalliance.org/lab-of-the-future-report-2023](http://www.pistoiaalliance.org/lab-of-the-future-report-2023).
4. Mock, Marissa, et al. "AI can help to speed up drug discovery — but only if we give it the right data." *Nature*, vol. 621, no. 7979, 2023, pp. 467–470, <https://doi.org/10.1038/d41586-023-02896-9>.
5. "What the Data Tells Us about Digital Transformation, by Industry." *Www.Bcg.Com*, Boston Consulting Group, Jan. 2022, [media-publications.bcg.com/BCG-Biopharma-Digital-Transformation-by-Industry-June-2022.pdf](https://www.bcg.com/media-publications/bcg.com/BCG-Biopharma-Digital-Transformation-by-Industry-June-2022.pdf).
6. "ASTM International Standard Guide for Laboratory Informatics E1578-18." *ASTM International*, E, no. 1578, ser. 18, June 2019, pp. 1–63. 18.
7. Shanler, Michael et al. "Hype Cycle for Life Sciences." *Gartner*, 24 Jul 2023, <https://www.gartner.com>.
8. Bughin, Jacques, et al. "McKinsey Quarterly - The Right Digital-Platform Strategy." *McKinsey Insights*, McKinsey and Company, May 2019, <https://www.mckinsey.de/-/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/The%20right%20digital%20platform%20strategy/The-right-digital-platform-strategy.pdf>.
9. Albrecht, B, et al. "Top Ten Observations from 2022 in Life Sciences Digital and Analytics." *McKinsey & Company*, McKinsey & Company, 31 Jan. 2023, [www.mckinsey.com/industries/life-sciences/our-insights/top-ten-observations-from-2022-in-life-sciences-digital-and-analytics](https://www.mckinsey.com/industries/life-sciences/our-insights/top-ten-observations-from-2022-in-life-sciences-digital-and-analytics).
10. Kudumala, Aditya, et al. "Biopharma Digital Transformation: Gain an Edge with Leapfrog Digital Innovation." *Deloitte Insights*, Deloitte, 7 June 2023, [www2.deloitte.com/us/en/insights/industry/life-sciences/biopharma-digital-transformation.html](https://www2.deloitte.com/us/en/insights/industry/life-sciences/biopharma-digital-transformation.html).
11. Halpern, Marc, et al. *Review of Innovation Insight: Implement Digital Threads for Long-Term Flexible Access to Critical Data*, *Gartner.com*, <https://www.gartner.com/document/4021009?ref=solrAll&refval=379436240&> Accessed 26 Sept. 2023.

 Learn more at [thermofisher.com/digitalscience](https://thermofisher.com/digitalscience)