Drug development solutions

Accelerate drug development with innovative 360° CDMO and CRO solutions:

A comprehensive guide to streamlining drug development and reducing time to market

Introduction

The search for efficient approaches to drug development and right-first-time strategies remains one of the most important efforts for pharmaceutical companies as they continue to experience diminishing returns on research and development investments and prolonged development timelines.

This eBook describes solutions to help maximize resources and minimize risks throughout all phases of drug development to facilitate each Sponsor's unique drug development journey and support their aspirations to get treatments to patients faster. Key topics covered include:

- **Current state of the drug development market:** A discussion of today's landscape and trends
- **Differentiated solutions and capabilities:** A description of Thermo Fisher Scientific's 360˚ CDMO and CRO solutions, and how these offerings can enhance the drug development process.
- **Case studies:** Demonstrations of how streamlined and efficient processes can reduce risk and improve scalability, helping Sponsors decrease time to market.
- **Industry Insights:** Summary of key insights from industry leaders with respect to enhancing drug development efficiency, the value of integrated drug development, and regulatory challenges and solutions.

This eBook focuses specifically on Accelerator™ Drug Development, Thermo Fisher Scientific's 360˚ CDMO and CRO solutions, to support your aspiration to get treatments to patients faster.

The state of drug development

Some of the most important challenges in today's drug development landscape include the high cost of labor, equipment, and supplies, as well as long and sometimes unpredictable timelines. The average cost of developing a new drug rose to $2.3 billion in 2022, with cycle times extending over seven years (Deloitte 2023). In addition to cycle times, some of the costs are driven by the increasing complexity of new APIs and formulations, clinical trial designs, and patient recruitment. Projected return on investment for pharmaceutical drug development fell to 1.2% in 2022—the lowest return observed since 2010 and substantially lower than the 6.8% observed in 2021 (Deloitte 2023).

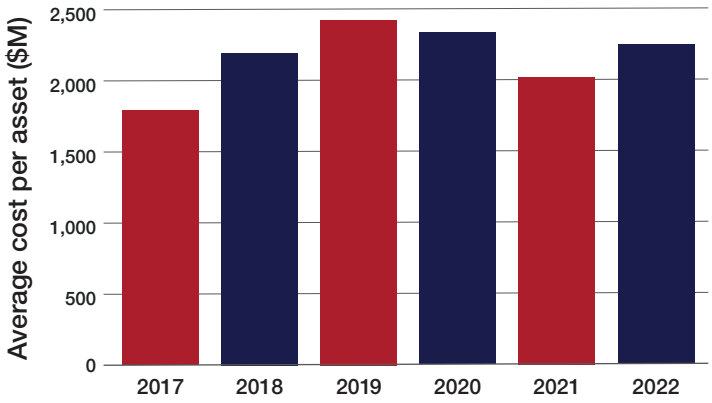


Figure 1. The rising costs of bringing assets to market (Source: Deloitte 2023).

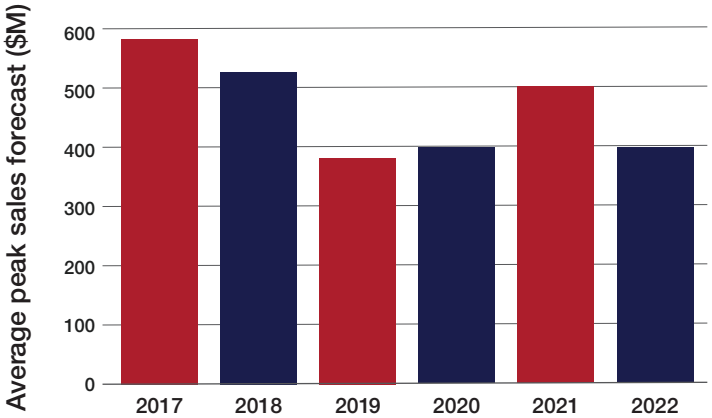


Figure 2. Dropping average peak sales forecasts (Source: Deloitte 2023)

Twenty companies analyzed by Deloitte Center for Health Solutions spent $139 billion on research and development in 2022 (down 2% from 2021), and the average forecast peak sales per asset decreased to $389 million in 2022 from $500 million in 2021 and $422 million in 2020. With COVID-19 emergency use authorization (EUA) assets excluded, the average peak sales forecasts fell from $340 million in 2021 to $284 million in 2022. Deloitte attributed much of this drop to high-valued assets leaving the pipeline in 2022 (Deloitte 2023).

Further underscoring the risks associated with drug development, the number of terminated assets doubled from 15 in 2021 to 30 in 2022, including six that were forecasted to be 'blockbuster' assets (Deloitte 2023) Risks such as these highlight the urgent need to streamline the complex drug development process, thereby reducing costs, including those associated with lengthy timelines. In this environment, the benefits of an integrated approach that consolidates essential drug development services cannot be overstated, particularly for small and emerging biotech and biopharma companies that are just entering the market or in the midst of progressing a clinical trial for any molecule type.

Real-world success stories

Managing global distribution and avoiding supply shortages

A mid-size pharmaceutical developer with an established partnership with Thermo Fisher Scientific performed initial active pharmaceutical ingredient (API) development work at the Thermo Fisher Scientific site in Regensburg, Germany. The project was transferred to the Linz, Austria site in 2022 for large-scale production.

The customer needed to coordinate multiple API shipments from Linz to Canada to support clinical trial material (CTM) and validation activities. The project required leveraging Total Transportation Management (TTM) services by Thermo Fisher Scientific to arrange multiple CTM batch shipments to the Mt. Prospect, IL site in the US for clinical packaging and labelling to support seven ongoing clinical studies across more than 30 countries. In total, TTM supported shipment of 71,687 kits to clinical sites out of Mt. Prospect, and another 14,993 kits to clinical sites out of the site in Rheinfelden, Germany.

A number of challenges arose during the course of the project. Because of the broad population of prospective patients across multiple clinical sites, over-enrollment posed a risk of supply shortages. The specific packaging format used for the study (40-count bottles) were no longer being produced and used a previous API source registered with global regulatory agencies. The new API source (from Linz) could only be used for resupply in the US which left the EU at risk of stockout.

The Thermo Fisher program manager was notified of the risk during internal project management alignment calls with the clinical trial supplies project manager. The drug product program manager carefully tracked risk in a combined dashboard which offered full visibility into inventories and supply chain actions. The drug product program manager strategized multiple options internally, including the timeline and cost impacts of each. The strategies were then presented to the customer for review, and the project team collectively decided to divert some supplies already in the pipeline with the previous API to the EU market to avoid regulatory impact. A split manufacturing approach was adopted where an upcoming drug product manufacturing batch with Linz API was split into 110-count and 40-count bottles at the packaging site in Whitby, Ontario (Canada). The team avoided patient impact by making the decision to circulate 40-count bottles to the US clinical sites where API source was not a regulatory issue.

To summarize, the integrated project management structure allowed the Thermo Fisher Scientific team to identify risk early on and to work collaboratively across business units to assess and present options to the customer for review. In the end, the challenges had minimal impact on the project timeline and material waste volume, and no impact on the clinical study. All First Patient First Dose targets were met.

Industry Insights (Ic)
Enhancing drug development efficiency

The Deloitte Center for Health Solutions' report, "**Seize the digital momentum: Measuring the return from pharmaceutical innovation 2022**" projects the return on investment (ROI) from late-stage pipelines of a cohort of 20 leading biopharma companies. The report showed a return in 2022 to a pre-pandemic-level internal rate of return (IRR) after a high point in 2021 which was attributed to several pandemic-related EUAs (Deloitte 2023). Projected ROI for pharmaceutical drug development fell to 1.2% in 2022 from the 6.8% observed in 2021 and 2.3% in 2020.

Increasing costs for materials, supplies, and labor, as well as indirect costs, have had a great effect on the drug development industry. The report calculated the average cost of developing a new drug from discovery to launch as $2.284 billion. Much of this cost is driven by average clinical trial cycle times which increased to just over seven years in 2022 (up from 6.90 in 2021 and from 6.15 in 2014). Increased cycle times are attributed to the increasing complexity of clinical trials and challenges in patient recruitment and retention (Deloitte 2023)

At the same time, forecasts for average peak sales per asset have decreased to $389 million in 2022 from $500 million in 2021 and $422 million in 2020 (Deloitte 2023).

All of these challenges reinforce the need for integrated solutions—such as Thermo FIsher Scientific's Accelerator™ Drug Development, 360° CDMO and CRO solutions—that can reduce costs and shorten timelines through efficient processes and risk minimization. The global network and unified CDMO and CRO services provided as part of this end-to-end offering can address many of the most important current challenges in drug development.

Introducing Thermo Fisher Scientific differentiated solutions and capabilities

The drug development journey requires tremendous effort and coordination on the part of many individuals across numerous areas of expertise. As part of Thermo Fisher Scientific's Accelerator™ Drug Development, 360° CDMO and CRO solutions, global subject matter experts operate as one unified, accessible team to provide a suite of world-class solutions across the clinical development spectrum, including both CDMO and CRO support. Thermo Fisher's Accelerator™ Drug Development solutions and end-to-end capabilities range from drug substance to drug product development to clinical trial research, manufacturing, supply optimization, and logistics through to commercialization and beyond. These 360° capabilities help customers simplify and accelerate the drug development process, all made possible by Thermo Fisher's state-of-the-art technologies, dedicated team members, and strong global network.

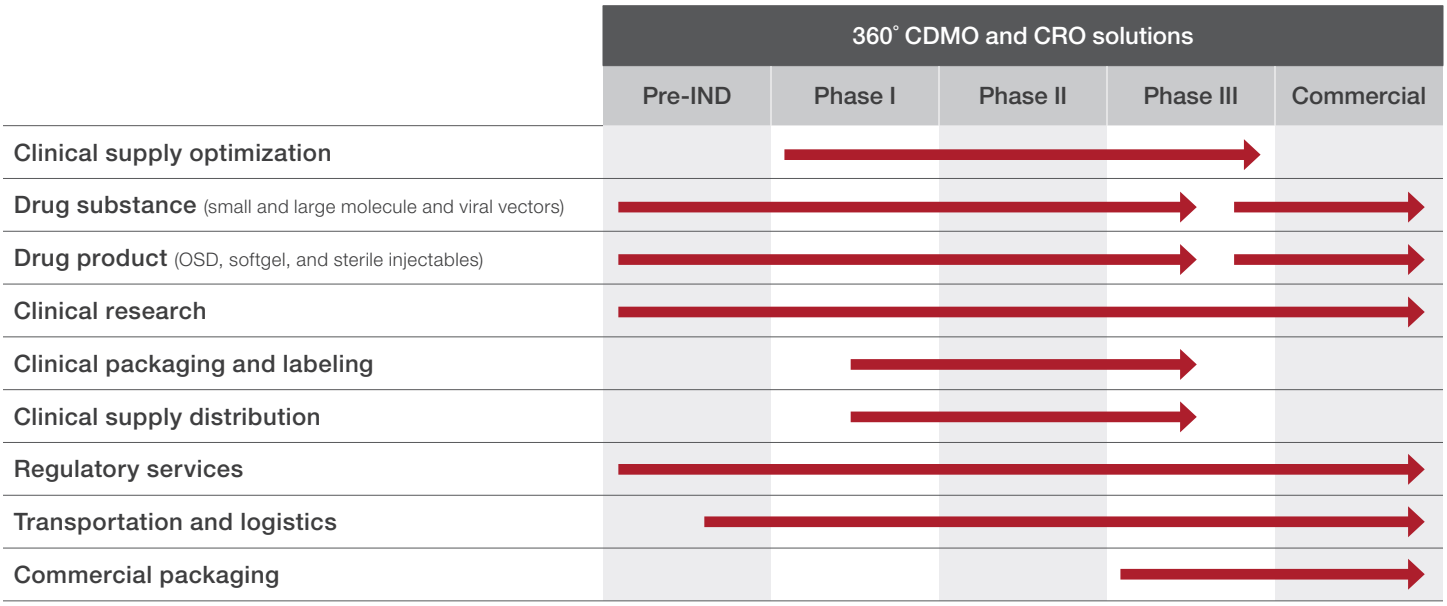


Figure 3. Thermo Fisher's custom integrated solutions save time and resources and minimize risk

Benefits of Thermo Fisher Scientific's Accelerator™ Drug Development solution

This comprehensive, flexible solution is designed to take a molecule from investigation to commercialization, quickly and efficiently. It streamlines drug substance and drug product development, demand planning, and clinical trial supply execution into a single, customized offering. Global experts provide unified program management and scientific and technical insight while curbing redundancies to ensure success across the drug development journey. Each element of the Accelerator™ Drug Development solution focuses on patient-centricity with the goal of getting drugs quickly and safely to the people who need them.

Figure 4. Thermo Fisher Scientific's Accelerator Drug Development offers a single, unified, patient-centric solution for the entire drug development journey.

Working with Thermo Fisher Scientific prevents the need for multiple hand-offs between vendors and the development of operational silos, which frequently result in workflow and process inefficiencies, product knowledge gaps, and potential timeline delays or “whitespace” where progress is paused—an approach that puts the Sponsor at the center of a complex network, the management of which requires considerable resources and time.

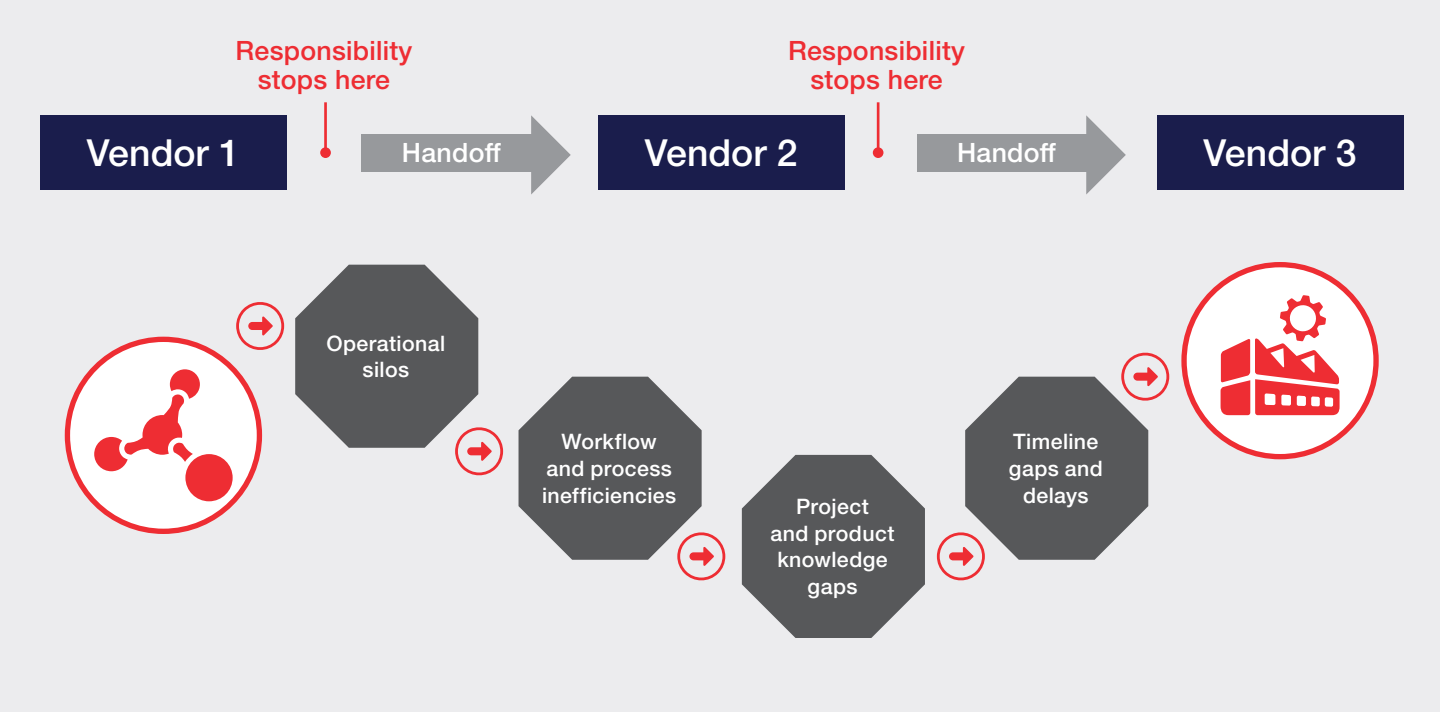


Figure 5. Working across multiple vendors can negatively impact decision-making and impede progression

An integral part of Accelerator Drug Development solutions is the provision of experienced, dedicated program managers who take responsibility for the entire length of the project. They act as customer advocates, team integrators, and risk mitigators across the drug development journey. They create and manage the governance process and draw on technical experts from across the Thermo Fisher Scientific network. The program managers maintain full visibility of all milestones and critical tasks and provide coordination, communication, commitment, and accountability across the entire supply chain. Experience has shown that this approach offers improved efficiency and reduces overall program risk by leveraging tools and processes across the network, end-to-end.

Real-world success stories

Rapid development and scale-up of a COVID-19 treatment

A large, multi-national pharmaceutical company with a potential breakthrough COVID-19 treatment in capsule format partnered with Thermo Fisher Scientific for drug substance production at the Cork, Ireland site. Drug product production occurred at two sites in Cincinnati, OH (US) and Whitby, Ontario (Canada) with technical transfer between sites.

Challenges arose with respect to needs for rapid scale-up, the transfer process between drug substance and drug product sites, and the volumes required to meet the global demand. The unique and urgent need for effective COVID-19 treatments required production of more than 2 metric tons of drug substance and the manufacture of more than 200 million capsules within a 12-month timeframe. Once the EUA was granted, product needed to be supplied into the US, the EU, China, and Japan.

To address these needs for rapid development and scale-up, the customer partnered with the dedicated overall program management services offered by Thermo Fisher Scientific. The program managers addressed these challenges by coordinating efforts across networks, establishing governance systems, and providing clear visibility into processes along the way. The solution hinged upon strategic coordination of production materials and a detailed understanding of pooled material requirements across both drug product sites. The team leveraged purchasing power with suppliers through the Thermo Fisher Scientific global procurement team and established upfront commitments for production slots of critical materials. The program managers also called upon the technical expertise of the drug substance team to address scale-up challenges.

The efforts of the Thermo Fisher team to exercise purchasing power and obtain upfront purchasing commitment resulted in the avoidance of a 52-week lead time for critical materials. Drug product raw materials were on-hand at the start of the manufacturing campaign at both sites, and both drug substance and drug product processes effectively scaled up such that the targeted volumes of drug product were produced at both locations in under 11 months.

Industry Insights
Value of integrated drug development

PhRMA's "Modernizing Drug Discovery, Development & Approval" report highlights the substantial time and cost investments required for developing innovative medicines, with an average development time of over 10 years and costs reaching $2.6 billion per successful drug (including failures). The report from 2016 emphasizes the low success rate in the industry, with only 12% of drugs entering clinical trials ultimately gaining FDA approval. The risks underscore the need for streamlined and integrated development processes to enhance efficiency and reduce costs. The report also calls on FDA to make changes to modernize and accept innovative tools and strategies used to seek approval. Innovators should be sure they have the regulatory expertise in-house or through partnerships to keep up with any changes the agencies make to address the evolving challenges and complexities of today's development landscape.

PhRMA's "**Research and Development Policy Framework**" discusses the extensive R&D investments made by biopharmaceutical companies. They credit these investments for unprecedented therapeutic advances and highlight personalized medicines and immunotherapies which are helping to save and improve so many lives. Among their member companies, including 30+ of the world's largest drug developers, annual R&D investment has more than doubled in the last 10 years. They name the biopharmaceutical industry as "the most R&D-intensive industry in the US economy." But these investments come with risk.

The financial commitment to finding new and effective treatments must be matched with the most careful management of the processes required to "cross the finish line." Whether avoidable or unavoidable, errors and delays in the development journey do nothing but reduce ROI and threaten efficient delivery of effective therapies to patients who are waiting for them. The level of investment and the numerous threats to ROI reinforce the need to consolidate services and manage regulatory challenges effectively. Accelerator™ Drug Development, 360° CDMO and CRO solutions by Thermo Fisher Scientific, focuses on improving drug development outcomes, allowing developers to focus on innovation.

Real-world success stories

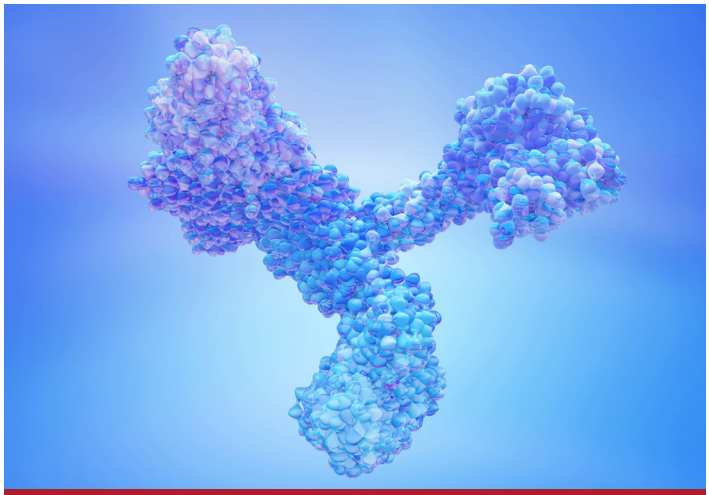
Strategic partnership with a biopharmaceutical company focused on muscle activators

A late-stage biopharmaceutical company, focusing on developing new medicines in the field of muscle activators and inhibitors for patients with diseases like amyotrophic lateral sclerosis (ALS), heart failure, and hypertrophic cardiomyopathy (HCM), began their small molecule program in 2021 with one molecule. They partnered with the drug product team at Thermo Fisher Scientific's Toronto, Ontario (Canada) sites and with the clinical supplies team (packaging, labeling, and distribution) at the Mt. Prospect, IL (US) site.

This customer requested a single point of accountability across their portfolio and faced timeline constraints with manufacturing batches due to aggressive targets for their registration campaign. Additionally, their project involved complex supply chain logistics across a trial program that spanned multiple countries.

These challenges were addressed at a strategic level through an effective partnership between Thermo Fisher Scientific and the customer including regular, executive-level engagement. The customer leveraged the expertise of Thermo Fisher Scientific from the outset, ensuring excellent communication across all business units. This approach provided real-time visibility of program execution via digital tools, Smartsheets, and dashboards. The team leveraged **Total Transportation Management (TTM)** services by Thermo Fisher Scientific to move, store, and manage product for clinical supplies and to meet trial timelines.

The customer was able to leverage Thermo FIsher Scientific's Accelerator™ Drug Development solution for scalability. Thermo Fisher now manages four molecules in their portfolio and is currently reviewing an end-to-end strategic partnership model with this client including– at their request–executive sponsorship across all business units. Further expansions of the partnership are planned, including agreements with PPD (acquired by Thermo Fisher Scientific in 2021) to secure clinical research projects for their current and future pipeline.



Industry Insights

Regulatory challenges and solutions

FDA's "2023 Guidance Agenda" from the Center for Biologics Evaluation and Research (CBER) outlines the regulatory priorities and challenges faced by the industry, providing valuable insights into the complex regulatory landscape (AABB 2023). In particular, the agenda discusses the development of 11 new guidance documents to address issues of regulatory importance in blood and biotherapies drug development, such as donor eligibility and process automation. In their 2023 fiscal year alone, the Center for Drug Evaluation and Research (CDER) published 13 such guidance documents, each of which contains critical information on unique aspects of development (**FDA 2024a**).

FDA also recently published several documents addressing the challenges and opportunities associated with artificial intelligence and machine learning in drug development (**FDA 2024b**). Many small and emerging biotech and biopharma companies simply do not have the in-house capability to maintain expertise with regulatory guidance or to keep up with the volume of information issued periodically through the regulatory agencies.

Thermo Fisher provides regulatory services that help ensure compliance with these evolving guidelines from development through commercialization, facilitating smoother progress through regulatory pathways. Thermo Fisher's regulatory services range from consulting early- and late- phase development requirements, to facilitating pre-IND meetings, to drafting submissions. Having this expertise available through all phases of development can reduce the risk of costly errors and omissions along the way.

Conclusion

This eBook outlines the current challenges innovators face in today's drug development landscape, including the increased costs of bringing drugs to market, high failure rates, and decreasing returns on investment. Many of the risks to development budgets and timelines can be attributed to inefficiencies in processes associated with the use of multiple vendors. Strategies that streamline drug development from early discovery to commercialization are critical to overall success.

Accelerator™ Drug Development by Thermo Fisher Scientific is a 360° end-to-end suite of drug development and clinical services spanning drug substance and drug product manufacturing for small molecule, large molecule, and advanced therapies, clinical supply, clinical research, and commercialization. This unique fully integrated suite of services ensures accountability across the drug development process, enabling increased speed, simplicity, and scalability.

All of these services, under the oversight of a dedicated program manager and supported by a global network of experts, allow companies to achieve greater efficiency and coordination throughout the drug development process. Accelerator™ Drug Development focuses on service integration, process efficiency, risk reduction, and expertise. Case studies demonstrate how Accelerator™ Drug Development can enhance drug delivery through streamlined and efficient processes, reduced risk, and improved scalability.

In summary, end-to-end solutions that can support drug development from early discovery through to commercialization, and provide the critical expertise and management needed for companies to address immediate challenges, can accelerate drug development and pave the way to a future where innovative treatments reach those in need more quickly than ever before.

References

Association for the Advancement of Blood and Biotherapies (AABB). Regulatory update: FDA releases 2023 guidance agenda. January 31, 2023. Available at: https://www.aabb.org/news-resources/news/article/2023/01/31/regulatory-update-fda-releases-2023-guidance-agenda.

Deloitte Center for Health Solutions. Seize the digital momentum: Measuring the return from pharmaceutical innovation 2022. Available at: https://www.deloitte.com/global/en/Industries/life-sciences-health-care/analysis/measuring-the-return-from-pharmaceutical-innovation.html

PhRMA. Modernizing drug discovery, development, and approval. 2016. Available at: https://phrma.org/en/resource-center/Topics/Research-and-Development/Modernizing-Drug-Discovery-Development-and-Approval.

PhRMA. Research and development policy framework. Last updated January 22, 2024. Available at: https://phrma.org/policy-issues/Research-and-Development-Policy-Framework.

US Food and Drug Administration (FDA). Guidance Agenda: Guidance Documents CBER is Planning to Publish During Calendar Year 2024. 2024a. Last updated July 3, 2024. Available at: https://www.fda.gov/vaccines-blood-biologics/biologics-guidances/guidance-agenda-guidance-documents-cber-planning-publish-during-calendar-year-2024.

US Food and Drug Administration (FDA). Artificial Intelligence and Machine Learning (AI/ML) for Drug Development. 2024b. Last updated March 18, 2024. Available at: https://www.fda.gov/science-research/science-and-research-special-topics/artificial-intelligence-and-machine-learning-aiml-drug-development.

PhRMA's Modernizing Drug Discovery, Development & Approval. https://www.pharmtech.com/view/phrma-releases-new-policy-solutions-delivering-innovative-treatments-patients

FDA's 2023 Guidance Agenda.

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