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Artificial intelligence (AI) is being adopted rapidly across the pharmaceutical industry, but few organizations have achieved the level of maturity required to scale it effectively beyond isolated pilots. According to a recent analysis cited in *MassBio* [1], nearly 80% of CDMOs remain in the early phases of AI adoption, with most still piloting narrow use cases rather than implementing enterprise-scale, integrated systems. This landscape underscores a broader shift in drug development: sponsors increasingly pair AI with more integrated operational models to reduce risk, accelerate timelines, and improve visibility across the clinical-to-commercial lifecycle.

Thermo Fisher Scientific refers to its integrated end-to-end capabilities and execution strategy as Accelerator™ Drug Development—a fully operational model that connects clinical development, clinical supply, and manufacturing through shared data, digital infrastructure, and coordinated execution, rather than a loose aggregation of services. While many organizations offer elements of integration across CRO or CDMO functions, Accelerator™ Drug Development is designed to minimize handoffs across the full development lifecycle, enabling continuity from study planning through commercial readiness. This approach reflects a broader industry push to reduce fragmentation, while underscoring the growing importance of execution models that are built to support AI at scale.

One major driver behind this shift: outsourcing is expanding rapidly, particularly in complex biologics. The global biologics Contract Development and Manufacturing Organization (CDMO) market alone is projected to nearly triple[2] in the next decade.

At the same time, pharma companies report[3] that data fragmentation and vendor handoffs are major sources of program delays and budget overruns, increasing the appeal of unified development partnerships.

As companies adopt AI to improve development predictability, they are also reassessing how organizational structures influence workflows and handoffs. When clinical and manufacturing teams operate within the same organization, "data and decisions stay more connected," helping limit delays during program transitions, according to Dinesh Kulkarni, vice president of information technology (IT), engineering, and operational excellence at Thermo Fisher.

Where AI Is Already Delivering Value

Clinical development remains a leading use case for AI, particularly in areas that remove uncertainty and manual burden.

"The most established applications today include enrollment forecasting, digital protocol development, data cleaning, and quality management," says John Van Hoy, executive director, external innovation at Thermo Fisher.

Independent analysis supports this[4]: AI-based enrollment prediction and risk-based quality management can reduce delays and cut monitoring costs.

On the manufacturing side, many CDMOs have embraced AI-enabled predictive maintenance[5] and real-time deviation detection to reduce downtime and waste.

Kulkarni says Thermo Fisher is seeing these improvements firsthand: "We've implemented systems with image analysis and real-time feedback, so potential issues can be detected before they become too large."

Integration As An Enabler

Despite progress, industry-wide handoffs between Contract Research Organizations (CROs), CDMOs, and suppliers still contribute meaningfully to delays, particularly at tech-transfer milestones.

But AI can only optimize what it can access. When clinical operations, supply chain, and manufacturing sit in separate organizations using incompatible systems, machine learning models lack continuity, which limits their benefit.

Thermo Fisher's Accelerator™ Drug Development aims to mitigate these gaps by embedding digital oversight

and shared data standards from the outset, allowing predictive insights from AI to carry forward from study planning to supply readiness and, ultimately, to commercial production.

This is where the integrated CRO and CDMO model becomes more than a value proposition, according to Van Hoy. When the full ecosystem operates under shared data governance, AI is able to:

- Align supply with enrollment and protocol changes in real time
- Reduce handoff lags and decision bottlenecks
- Improve tech-transfer consistency and readiness
- Detect risk earlier in both clinical and manufacturing workflows

Van Hoy underscores that both the volume and consistency of data are key: "A pharma company might run 50 studies a year. We [can] run a thousand. Data drives AI."

Operationalizing AI Responsibly

Industry adoption is also being shaped by guardrails around model reliability, ethics, and compliance.

Thermo Fisher follows two non-negotiable principles, according to Van Hoy: first, human accountability for any AI-supported work product, and second, systematic governance for AI use cases to ensure privacy and compliance.

Kulkarni notes that early caution positioned the company well for responsible acceleration. Adopting AI "really paid us back" once the underlying controls matured.

This aligns with industry guidance encouraging[6] strong governance frameworks before scaling generative or autonomous tools.

What's Coming Next: AI That Takes Action

The industry is shifting toward Agentic AI—systems that don't merely advise or respond to prompts, but execute controlled actions.

"Agents, in general, won't just give information—they'll take action," Van Hoy says. "They'll send documents, track status, and take tasks off people's plates…that's coming within the next year."

Across pharma manufacturing and CDMOs, companies are increasingly piloting AI-enabled real-time guidance, workflow automation, and process monitoring, replacing manual or paper-based workflows.

"What used to take five-to-seven days, we're doing now in real-time," Kulkarni says. "AI is talking to the operators."

A New Baseline For Speed And Reliability

AI is no longer an experimental add-on; it is becoming the connective tissue of modern drug development. Integrated outsourcing models, paired with digital maturity, create the conditions for that intelligence to work across functions instead of in isolated pockets.

As pressure mounts to launch therapies faster without compromising quality, industry leaders aren't just deploying tools, they're building processes to support continuous data flow and coordinated insight.

"Simply put, intelligent integration helps bring medicines to the patients much faster, in a much more efficient and cost-effective manner," Kulkarni says.

The companies that treat integration and AI as strategic infrastructure will be best positioned to deliver innovation at the speed patients deserve.

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