

The Connected Biopharma Enterprise: AI's Expanding Role from Research to Commercialization

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Anil Kane, Senior Director, Global Technical Scientific Affairs, Pharma Services at Thermo Fisher Scientific, discusses how interoperable data, AI-enabled scientific workflows, strategic technology partnerships, and integrated manufacturing are helping biopharma companies accelerate discovery, streamline development, and prepare for the next generation of advanced therapies.



Artificial intelligence is rapidly reshaping the way biopharma companies discover, develop, and manufacture medicines. However, realizing AI's full potential requires more than powerful algorithms—it depends on connected data, interoperable scientific workflows, and digitally integrated manufacturing. **In this conversation, Anil Kane, Senior Director, Global Technical Scientific Affairs, Pharma Services at Thermo Fisher Scientific,** discusses how AI-enabled research, strategic technology collaborations, and flexible manufacturing capabilities are helping organizations accelerate scientific discovery, improve operational efficiency, and bring increasingly complex therapies to market with greater speed and confidence.

AI-Enabled Research and Connected Scientific Workflows

Scientific organizations are generating unprecedented volumes of data. What are the key challenges in turning that data into actionable insights?

The challenge is structural. Scientific data exists across incompatible silos —instrument outputs, electronic lab notebooks, informatics platforms and process systems that generate data in incompatible formats with different semantic conventions. AI can work across these sources, but only when the underlying data is harmonized and governed correctly. In regulated environments, AI adoption also requires clearly defined intended use and traceable governance. Without these, AI tools surface noise as readily as signal. Organizations that have invested in AI-native data infrastructure are seeing real gains in decision speed and reproducibility. Those that have not find that layering AI onto a fragmented system makes the fragmentation more expensive to manage.

How are collaborations with technology leaders such as NVIDIA, OpenAI, TetraScience, and BenchSci accelerating scientific discovery?

Thermo Fisher has built a portfolio of partnerships with technology leaders, each targeting a specific bottleneck in the scientific workflow.

The OpenAI collaboration announced in late 2025 integrates OpenAI offerings capabilities into offerings like the Accelerator Drug Development platform, with a focus on improving clinical trial cycle times and identifying lower-probability candidates earlier in development.

In January 2026, Thermo Fisher announced a collaboration with TetraScience to integrate Thermo Fisher's instrumentation and informatics solutions with TetraScience's Scientific Data Foundry. The goal of this collaboration is to transform fragmented laboratory data into standardized, AI-enabled scientific workflows across research and development (R&D) and manufacturing.

The BenchSci partnership is centered around developing AI-enabled tools for experimental design, scientific literature review and reagent selection, drawing on BenchSci's ASCEND™ AI and proprietary biomedical knowledge graph.

What role will AI play in transforming laboratory operations and R&D productivity over the next five years?

Machine learning is already changing how formulation work gets done. Applied to early-stage development of poorly soluble compounds, predictive tools can generate formulation recommendations before significant amounts of active pharmaceutical ingredient (API) are committed to experimental work. For example, across more than 400 compounds in documented use, this approach has saved 144 kg of API and cut time to market by approximately three months. In-silico modelling platforms extend this further to strategy selection for amorphous solid dispersions. In manufacturing, AI-powered visual inspection has achieved an 84% reduction in vial particle rejection rates. Across all of these applications, the underlying logic is the same: AI handles the process management work so researchers can focus on scientific interpretation, where human judgment adds the most value.

How important is data interoperability in creating truly connected scientific workflows?

Interoperability is the precondition for AI to work at scale. Without it, AI tools trained on inconsistent or siloed data surface noise as readily as signal. The connected contract development manufacturing organization (CDMO) model addresses this at the operational level. It ensures data, materials and decision-relevant information move through a single integrated framework rather than requiring sponsors to manage system connections themselves.

When this connected infrastructure is in place, formulation insights can inform clinical design, manufacturing performance data can feed back into process optimization and regulatory submissions can be built on a coherent, traceable evidence base, across every stage of a development program.

Advanced Manufacturing and Commercialization

Demand for biologics and advanced therapies continues to grow globally. How are manufacturers adapting to support this expansion?

The global market for complex biologics is growing faster than conventional manufacturing infrastructure can keep up. Manufacturers are responding with flexible infrastructure: single-use bioreactor platforms that allow production volume to scale with clinical demand rather than with capital commitments made years in advance. The best of these platforms offers wide turndown ranges within a single system, eliminating the need to transfer processes as programs progress. Engaging CDMO partners at the pre-Investigational New Drug (IND) application stage to build a scalable manufacturing roadmap is now standard practice for programs targeting commercial viability.

What strategic importance do integrated development and manufacturing services have for emerging biotech companies?

Fragmentation is the default risk for emerging biotechs. Working with separate vendors for development, clinical supply, manufacturing and commercialization introduces handoffs that are each an opportunity for data to be lost or delayed. With more than [30% of drug approvals now originating from biotech companies](#), up from under 10% a decade ago, and many targeting rare diseases where timeline delays have direct patient consequences, the operational burden of managing a fragmented vendor base deters from scientific focus.

How are recent investments in biologics, sterile fill-finish, and device assembly strengthening the industry's ability to accelerate commercialization?

Expanded sterile injectable manufacturing, packaging and development capabilities increase flexibility and help sponsors scale production as programs advance. In device assembly and combination products, the company's integrated capabilities bring fill-finish, autoinjector assembly and packaging together within a single hub, simplifying technology transfer and reducing operational complexity. Investments in bioanalytical laboratories, GMP manufacturing and Phase I clinical capabilities further strengthen the network and provide sponsors with access to expertise across the development lifecycle.

At the same time, accelerating commercialization increasingly depends on digital capabilities that improve operational execution across manufacturing and quality. Thermo Fisher is applying AI-enabled tools within Quality Operations to reduce turnaround times for quality deviations, helping teams investigate, resolve and close events more efficiently while maintaining compliance and product quality standards. The company has also piloted its Digital SME (dSME) tool, which leverages manufacturing data and process expertise to improve planning and scheduling, enhance manufacturing efficiency and strengthen real-time performance monitoring. Together, these digital investments complement physical capacity expansion by helping sponsors move products through development and commercialization with greater speed, visibility and operational consistency.

What are the biggest manufacturing challenges facing biopharma companies in 2026?

The most consistent challenge is the intersection of increasing molecular complexity with compressing timelines.

Geopolitical pressures on upstream supply chains are compounding this, particularly for raw materials and APIs sourced from geographically concentrated supply bases. Many manufacturers are moving toward hybrid sourcing strategies. This may look like maintaining cost-competitive offshore capacity while selectively nearshoring higher-risk inputs, to balance cost against supply security.

What trends do you expect to define the future of biopharmaceutical manufacturing over the next decade?

Single-use manufacturing will continue to expand into commercial-scale production. The flexibility it enables, scaling within the same platform without the cleaning and sterilization demands of stainless-steel infrastructure, fits a development environment where demand forecasting uncertainty is permanent. Advanced therapeutic modalities will drive the biggest structural change: cell and gene therapies, bispecific antibodies, antibody-drug conjugates (ADCs) and RNA-based platforms require manufacturing processes, analytical capabilities and quality systems built specifically for their technical requirements. CDMOs that have invested in both the infrastructure and the scientific expertise for these modalities will be well-positioned; those that have not will face an increasingly difficult capacity environment as pipeline complexity grows.