tetrascience

Optimizing cell and gene therapy production with LabVantage and TetraScience

CUSTOMER STORY

Patients come first. This mantra is echoed throughout the biopharmaceutical industry, from global pharmaceutical companies to contract development and manufacturing organizations (CDMOs). However, in the case of cell and gene therapies, reality can disappoint. Some CDMOs struggle to fulfill this promise as they lack experience in manufacturing these advanced therapies.

This has serious consequences: Patient lives are at stake.

Producing cell and gene therapies is exceptionally complex, often requiring patient-specific batches. The biopharma industry aims to accelerate the development and scale-up of these processes, which demands high-fidelity, analytics-ready data. For the CDMOs that enable these treatments, operational efficiency isn't just about saving time and money; it can be a matter of life and death.

Challenge:

Scientists at a leading CDMO used inefficient, error-prone data processes, including paper records and spreadsheets, to develop and manufacture cell and gene therapies.

Solution:

The Tetra Scientific Data and AI Cloud, combined with bidirectional integration with LabVantage LIMS, streamlined workflows through automated data replatforming and engineering.

Result:

- Higher productivity for scientists
- Improved data integrity
- Future-proof, AI-ready data

The Challenge

With lives on the line, moving faster—and more safely—is imperative. This led one industry-leading CDMO to modernize its scientific data strategy for the development and analysis of cell and gene therapies. Initially, scientists relied on paper-based records and validated spreadsheets to track and record data. These methods were slow and prone to human error.

Transitioning to a laboratory information management system (LIMS) would offer significant improvements by digitizing records and reducing manual data entry. This shift would free scientists from tedious tasks, allowing them to focus on higher-value activities. However, a LIMS alone would not address all their data management challenges. It lacks the data replatforming and engineering capabilities needed for advanced analytics and AI.

The Solution

The CDMO decided to implement an integrated solution combining LabVantage LIMS with the Tetra Scientific Data and AI Cloud™ (see figure). The Scientific Data and AI Cloud automatically collects data from laboratory instruments, contextualizes it with scientifically relevant metadata (e.g., sample or plate ID), and converts it into an open, vendor-agnostic format. The resulting Tetra Data is optimized for analytics and AI—large-scale, liquid, compliant, and purpose-engineered datasets.

The Scientific Data and AI Cloud communicates bidirectionally with LabVantage LIMS via REST API. Automated pipelines in the cloud retrieve sample or batch information from the LIMS and prepare the experimental results for ingestion back into the LIMS, where scientists can then review the data.

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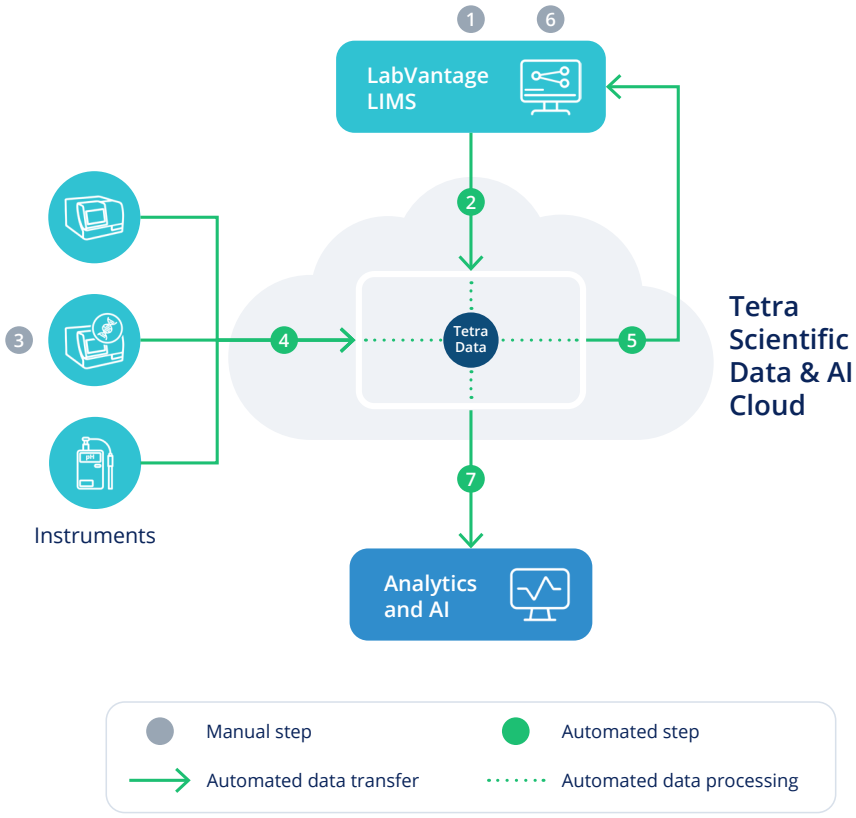

1. Scientists input sample or batch information into LabVantage LIMS.
2. The Tetra Scientific Data and AI Cloud automatically ingests the data via REST API.
3. Scientists conduct tests on samples with plate readers, ddPCR and qPCR systems, balances, and pH meters.
4. The Scientific Data and AI Cloud automatically ingests the raw instrument data (via agents or connectors) and engineers it into Tetra Data, incorporating information previously captured from the LIMS.
5. The platform automatically prepares and uploads the relevant data to LabVantage LIMS using the REST API.
6. The scientists review the results in LabVantage.
7. Tetra Data is available for consumption by advanced analytics and AI applications.

The Result

Pairing a modern lab informatics system with the Tetra Scientific Data and AI Cloud brings this CDMO significantly closer to fully digitizing its data processes. This solution has led to the following outcomes.

- **Higher operational efficiency:** Scientists can redirect time previously spent on manual data transcription and management to more valuable work.
- **Improved data integrity:** Automated workflows minimize human errors and enable full data traceability, enhancing product quality and safety while ensuring compliance.
- **Future-proof data:** The Scientific Data and AI Cloud ensures that data can be reused in the future by replatforming and engineering it into analytics- and AI-ready Tetra Data.

AI Readiness

Looking ahead, the CDMO plans to enhance its operations by leveraging its AI-native Tetra Data for advanced analytics and AI applications. These tools can help scientists quickly identify quality trends and anomalies during the manufacturing of cell and gene therapies. Predictive models can preemptively flag potential out-of-specification results, saving time, money, and potentially lives. Should deviations occur, AI-enhanced root cause analysis can enable faster and more effective corrective actions.

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