

Streamlining Scientific Workflows in Biomanufacturing

How Signals LabGistics™ addresses pain points in drug development

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Summary

Biomanufacturing is currently one of the most transformative sectors in the modern bioeconomy, with rapid advances being made in product yield and scale-up feasibility. Naturally, the sector shares challenges that are common in many manufacturing industries, such as fragmented systems, manual coordination, and unstructured email handoffs between teams. Scientists spend significant time coordinating between groups rather than optimizing processes, and managers often cannot identify bottlenecks until projects are already delayed. Nevertheless, speed to market is vital, and techniques to resolve these workflow coordination gaps and reduce operational inefficiencies are highly desirable.

This white paper highlights how a viral vector biomanufacturing group within the Revvity Viral Vector Center of Excellence, based in Munich, Germany, is working with the Signals LabGistics team to streamline the path from technical execution to project delivery. With a particular focus on addressing key pain points in project management, Irene Ferreira, Strategy Leader in Viral Vector Manufacturing at Revvity, outlines how labs can utilize workflow management software that supports automated, multivariate, AI-driven approaches to save both time and resources.

Introduction

Biomanufacturing, an age-old science with roots in the production of bread, beer, and wine, harnesses biological systems to produce commercially important biomolecules. In the 21st century, we are experiencing a new revolution of biomanufacturing, producing both novel products and manufacturing existing products by far more effective means, with advances in product yield, product titer, volumetric productivity, scale-up feasibility, and sustainability.¹ The global biomanufacturing market is one of the most transformative sectors in the modern bioeconomy, and is projected to experience exceptional growth over the next decade.²

Typically, biomanufacturing is categorized into two main phases: upstream and downstream. While upstream processes are used to grow a cell line and express the desired bioproduct, downstream processes purify the product and formulate it for a specific use. These phases are often preceded by molecular biology phases and followed by analytics. With complex, detailed workflows, all phases of biomanufacturing require careful project management, and present

diverse challenges to scientists.

Challenges in Biomanufacturing

Pharmaceutical companies developing biologics and other innovative drugs can be plagued with coordination gaps that slow drug development. With multiple interdependent teams working together, the challenge of smooth, streamlined development is substantial. While existing software tools such as laboratory informatics systems (LIMS), electronic lab notebooks (ELN), and laboratory and manufacturing execution systems (LES and MES) excel at domain-specific data management, they struggle to orchestrate data flow between teams or drug development phases. Some of the specific challenges faced in biomanufacturing include:

- **Email-based handoffs:** Teams coordinate through email chains, spreadsheets, and meetings. Work stalls while waiting for approvals, samples get lost in transit, and it can be exceptionally difficult to establish a clear picture of what's actually in progress
- **Fragmented systems:** Each team has its own tools – LIMS for samples, ELN for experiments, MES for manufacturing and LES for equipment, and separate quality systems – but there is no unified view of the entire workflow
- **Manual coordination:** Scientists spend hours checking on samples, chasing approvals, updating spreadsheets, and coordinating with other teams instead of doing science
- **Sample tracking gaps:** Samples move between teams and phases, but tracking is manual. Lost samples, misplaced IDs, and an unclear chain of custody can create compliance risks
- **Tech transfer friction:** Moving from development to manufacturing requires manual documentation, repeated validation, and endless clarification. Months of delay can result from handoff gaps
- **No visibility:** Managers are unable to see process bottlenecks until projects are late. A real-time view of workflow status, active tasks, or resource utilization, is lacking

Addressing these challenges through integrated workflow management has the potential to reduce operational inefficiencies and alleviate pain points for scientists, making complexity easier to manage.

Using Signals LabGistics to Streamline Project Management Workflow

Irene Ferreira describes the challenges in biomanufacturing that her team experiences, and the benefits that Signals LabGistics will bring, with a specific focus on project management.

The viral vector biomanufacturing team within the Revvity Viral Vector Center of Excellence produces viral vectors that pharma and biotech companies use in the discovery and preclinical phases of gene therapy development. In Munich, viral vector biomanufacturing is supported by four core units: molecular biology, upstream, downstream, and analytics. Molecular biology generates the plasmids required for upstream processing, where producing cells (typically

grown in suspension) then produce vectors intracellularly. Downstream processing purifies vectors from the cell culture and media and formulates them for subsequent use. Analytics then assess critical quality attributes, including titer, impurities, and potency.

Each unit operates multiple workflows and protocols. The complexity at the project level results in several key pain points, as Ferreira explains:

- **Multiple fragmented tools:** “During the biomanufacturing process, information is passed through different tools, using a multitude of spreadsheets, requiring a lot of manual work,” emphasizes Ferreira. “Nothing is particularly automated, which is why applying Signals LabGistics will be so helpful.”
- **Time-consuming project onboarding:** When a client initiates a project with the biomanufacturing team, one of the first requirements is a timeline estimate. To generate this, the project must first be onboarded, which itself requires a significant number of steps, including in-depth assessment of timelines and logistics for each unit. These steps are currently managed in spreadsheets, which Ferreira notes are not ideal. “The onboarding process is highly time-consuming, as it involves multiple manual steps to gather inputs, assess timelines, and coordinate across units.”
- **Limited real-time visibility into process performance:** When issues arise, such as low titer, identifying the root cause is complex due to how data is currently collected. As Ferreira points out, problems are often only detected at the final step. Real-time monitoring through a workflow management system would enable earlier intervention or termination at defined decision points.
- **Slow, manual reallocation of equipment and staff when project timelines change:** “This is a huge challenge with spreadsheets,” emphasizes Ferreira. Each project is tracked in separate spreadsheets, often further split by unit. While team leaders assign tasks, there is no real-time visibility into whether a task is in progress or completed. As a result, subsequent teams lack real-time insight into task progress and cannot anticipate when work will be handed over. Ferreira notes that this can lead to delays, miscommunication, and even internal conflicts. Maintaining and updating multiple spreadsheets can take up to 10% of each team member’s time, representing a significant resource burden across projects.

In addition to addressing these pain points, Ferreira notes two additional project management benefits of integrating a workflow management system: data integrity, and traceability.

- **Data integrity:** When multiple spreadsheets are used, and project data is transferred between them, teams must spend considerable time verifying accuracy and ensuring that errors have not been introduced. For example, if a client requests a change to a buffer, aliquot, or concentration being used in an experiment, any failure to consistently update this information across teams can impact project timelines. Workflow management systems help mitigate alleviate these risks by maintaining data integrity across teams, platforms, and documents.
- **Traceability:** Because every biomanufacturing project is tailored, the processes and procedures often need to be adapted for specific vectors. When issues arise, it can be difficult to trace back through workflows to identify the root cause. Ferreira explains,

“One of the advantages we expect from Signals LabGistics is improved data granularity to help us pinpoint what isn’t working, and whether it is a process or operator error.” In addition, if the source of a problem, such as contamination, is identified, a workflow management system can be configured to require operators to capture specific information at each step, reinforcing consistency and traceable execution.

“Efficiency is the most important benefit of a workflow management system, in terms of project management,” says Ferreira. The Munich Biomanufacturing team will harness Signals LabGistics to manage both lab and project management workflows. Integrating these two levels will enable a more-seamless transition from technical execution to project delivery.

Signals LabGistics: A Workflow Management Solution

Signals LabGistics, an AI-first workflow management solution from Revvity Signals, is designed to optimize drug development processes such as biomanufacturing using AI-powered workflow generation and real-time monitoring to streamline and orchestrate complex scientific workflows. Addressing many of the pain points described above, Revvity Signals’ solution is designed to strategically manage how information flows from one place to another in the lab. Essentially, Signals LabGistics provides logistics for your lab, in the same way that the construction industry or automobile manufacturing uses logistics to increase efficiency and customer satisfaction, and to reduce costs.

- Signals LabGistics³ is a workflow management solution designed to orchestrate complex scientific workflows
- Developed in collaboration with a consortium of researchers across several countries and industries, Signals LabGistics aims to make it easier to manage complexity
- By creating a structured environment that supports design, planning, execution, and monitoring of workflows across diverse scientific fields, Signals LabGistics seeks to:
 - Generate automated workflows using AI-based natural language processing that convert SOPs and natural language descriptions into processes, workflows, and tasks while adhering to a human-in-the-loop philosophy
 - Bridge workflow coordination gaps by eliminating email handoffs and manual transfers between teams
 - Streamline task management and monitoring with tools that assign responsibilities, track progress and ensure accountability at every stage
 - Accelerate technology transfer through seamless handoffs between development and manufacturing processes
 - Ensure workflow consistency from early research through production scale-up, minimizing disruptions and inefficiencies.
 - Simplify regulatory compliance by supporting documentation and traceability in GxP and quality-controlled environments

Initially focusing on experiment orchestration and bioprocessing, Signals LabGistics will progress to support biomanufacturing, enabling a more seamless transition from technical execution to project delivery.

For more information about Signals LabGistics, read the brochure available at <https://revvitysignals.com/signals-labgistics>

Revvity Signals provides software and scientific informatics solutions that enable discovery organizations to capture, analyze, and act on complex experimental data. Through continued innovation in AI augmented discovery and platform infrastructure, Revvity Signals is helping scientists move faster, from insight to impact.

References

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