



The Ultimate LIMS Playbook

for Manufacturers

Laboratory Information Management Systems
Demystified by the Global Leader in Lab Informatics





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About This Playbook

Welcome to the Ultimate LIMS Playbook for Manufacturers. This is the definitive guide for mastering laboratory information management systems (LIMS), how to select the best LIMS for your quality and manufacturing laboratories, and best practices for the implementation process.

Whether your organization operates in pharmaceuticals, biotechnology, agrochemical, chemical, food & beverage, oil & gas, metals & mining, or contract development & manufacturing testing, managing lab operations is inherently complex. Intricate workflows, manual processes, and isolated data elevate risk and substantially lengthen the time required to process laboratory testing. The consequence? Increased lab and quality control costs and delays in product release.

LIMS technology empowers organizations to streamline lab workflows, reduce manual effort, and unify data, helping them optimize their labs for precision and accelerated performance.

As pioneers in the LIMS and laboratory informatics space, STARLIMS was founded with the goal of providing robust software solutions that help laboratories execute their product quality sampling strategies, manage their information needs, enable regulatory compliance, and promote laboratory and enterprise collaboration. With nearly four decades of knowledge, we created this playbook to impart the invaluable insights we've gleaned from the industry and our customers. **If you're looking to digitally transform your lab, use this playbook as both support and a launchpad on your journey toward selecting the best LIMS for your organization.**

THIS GUIDE SUPPORTS THE FOLLOWING INDUSTRIES

- Life Sciences
- Contract Development & Manufacturing Organizations (CDMO)
- Food & Beverage
- Chemical
- Oil & Gas
- Agrochemical
- Contract Testing Labs
- Metals & Mining
- Consumer Goods

Understanding LIMS

What is a LIMS?

A Laboratory Information Management System (LIMS) is software purpose-built to improve lab productivity and efficiency by maintaining all data associated with samples, experiments, processes, and workflows.

The technology provides a centralized, consolidated point-of-collaboration throughout the entire testing process, delivering a holistic view of laboratory operations and enabling teams to accelerate deployment and time-to-value. LIMS can also integrate with lab instruments and devices, to support completeness of data capture and minimize transcription errors.

With a LIMS, laboratories can automate workflows, minimize manual tasks, and, for organizations in highly regulated industries, it can simplify compliance and quality management while making your laboratory more efficient and precise.

Top Benefits of Implementing a LIMS

Improved Information Management: A LIMS centralizes lab data by integrating with lab equipment, instruments, and systems, allowing teams to manage workflows and samples throughout their entire lifecycle.

Increased Efficiency and Productivity: By digitalizing your data, lab personnel can access work at the bench and beyond, collaborate with colleagues, and expedite batch release, all while helping you maintain a manageable cost base.

Support for Compliance and Regulatory Requirements: With features like electronic signatures and audit trails, LIMS enable teams with fully traceable testing processes and samples.

Key Features and Functions



Sample tracking and management



Inventory management



Workflow automation and process optimization



Reporting, analytics, and visualization tools



Laboratory equipment and instrumentation management and integration

What a LIMS is Not

There are many software systems that support oversight of activities and workflows but are not optimized for laboratory processes. **Other systems you might encounter within your manufacturing environment may include...**

Home-Grown “LIMS”

Many laboratories today have some form of “laboratory information management system” to help manage their workflows. The term “LIMS” has been used to encompass a wide range of tools, technologies, and systems designed to streamline lab activities, but the complexity of these systems may vary, from simple spreadsheets to sophisticated programs that manage nearly every lab function.

Newer or smaller labs might piece together a functional “LIMS” from other general software programs. These solutions often focus on supporting just a couple of the capabilities that a robust LIMS solution offers. More established organizations that process hundreds of thousands of samples and tests weekly often require a more comprehensive solution.

Enterprise Resource Planning (ERP)/Materials Requirements Planning (MRP)

ERPs help organizations with core business processes (such as finance, HR, procurement, etc.) by tracking business resources and smart forecasting. MRPs are systems specifically designed to plan manufacturing production. MRPs support allocation of necessary materials, quantity estimation, and help organizations manage their overall supply chain.

You may also be familiar with systems like SAP. Manufacturers use ERPs like SAP for supply chain tracking, from receiving and shipping to task automation. They also utilize ERPs for quality control activities related to manufacturing. However, ERPs do not contain the sample plan management, equipment management, and integration with laboratory workflows needed to run labs efficiently and successfully.

ERPs and MRPs are not capable of overseeing all the complex elements of laboratory management. There are some LIMS now available in market that come with the ability to integrate directly with SAP through SAP Quality Manufacturing (QM) module. This allows data to be shared between the systems, so manufacturers using SAP QM can manage the administrative functions while the LIMS centralizes lab operations.

Manufacturing Execution System (MES)

Manufacturing Execution Systems (MES) are used in manufacturing to track and document the transformation of raw materials to finished goods. MES facilitates work in progress on the factory floor. MES support in-process quality control by allowing quality teams to set up their in-process quality testing plans, integrate with existing equipment and sensors on the production line, and collect data in real-time, all while the product is running in production to help support their overall objectives.

MES can provide real-time data on production processes, machine status, and material usage, and often integrate with ERP systems like SAP to provide a comprehensive view of manufacturing operations from planning to execution. Integrating MES with a LIMS can support the alignment of production and quality control processes, leading to improved overall efficiency and product quality.

Electronic Quality Management System (eQMS)

eQMS, or Electronic Quality Management Systems, help organizations manage quality, compliance, and product development. Quality-related processes and data can be centrally stored within an eQMS, allowing organizations to improve compliance, enhance quality, and manage workflows and documents more efficiently. eQMS are best used for post-production quality assurance activities, like corrective or preventative actions for products that don't conform to specifications. LIMS is more suited to support the testing that identifies whether a product deviates from specifications.

Computerized Maintenance Management System (CMMS)

Computerized Maintenance Management Systems (CMMS) are software systems that manage maintenance operations, such as equipment calibration and preventative maintenance. These systems manage the maintenance of equipment and devices both in laboratories, and beyond, such as the manufacturing floor. Both CMMS and LIMS can handle calibration management, but CMMS does it on a broader scale, while LIMS focuses on making sure lab instruments are calibrated and ready for use.



Selecting the Best LIMS for Your Organization

No LIMS on the market is one-size-fits-all. By identifying a LIMS that aligns with your business goals, IT infrastructure, and laboratory workflows, you will take a substantial step forward in improving your lab's overall efficiency and productivity. Here are some steps to take when selecting the best LIMS for your organization.

Identify Key Stakeholders

When initiating a LIMS selection process, consider the stakeholders across the organization that will benefit from the implementation of a central LIMS. **With these stakeholders, you can organize a buying committee:**



Lab & Quality Directors

Directors will want a system that provides the analytics needed to ensure manufacturing and labs are running efficiently and enable continual improvement.



Quality Control

QC personnel will likely be focused on finding a LIMS that supports data accuracy and testing completeness.



Lab Supervisors

Supervisors will look for a system that provides central oversight of all lab activities and workflows within the LIMS.



Quality Assurance

QA will want a LIMS that provides regulatory support and enables quick access to information to respond to audit requests.



Laboratory Personnel

The success of any LIMS selection is most reliant upon your users, and lab personnel will be invested in systems that make their workflows easier, not more complex.



Information Technology

IT will want to know that your organization is selecting a LIMS underpinned by sophisticated and secure technology.



Define Your Business Goals

Take the time to get aligned as a team on your overall business goals and define what your expected return on investment (ROI). **The process of research, vendor comparison, demo reviews, selection, and onboarding, from start to finish, can take up to 12 to 18 months.** This rigorous process is a significant investment of time and resources.

As such, it is key to define your goals *beyond* “digital transformation” and “lab automation.” Is your organization in need of...

- **Increased** new product introductions (NPI)?
- **Accelerated** time to market?
- **Improved** lab efficiency and productivity?
- **Reduced** risk?

What does your organization need to see from this investment for it to be deemed a success? Doing this work prior to your LIMS search is essential.

Document Necessary Capabilities

The success of your LIMS implementation will depend on user adoption, so putting in the effort up front to research and document the lab requirements and "nice-to-have" functions will go a long way. If your organization has multiple labs, you can use surveys, focus groups, and one-on-one interviews to measure the pulse of the organization and understand the needs of your teams at scale.

Outline the key activities your LIMS should support. It is also important to identify where interdependencies exist by researching and documenting the handoffs that take place. These steps will help your team build a list of vendor requirements and help narrow your search.

Identify Integration Requirements

Connectivity is critical in a lab environment. With multiple instruments, devices, and systems, collection and organization of lab data is complex. Look for a LIMS that is flexible and configurable. Modern LIMS are able to interface with instruments and devices, automate data collection, and connect with other systems in the organization. Document your organization's existing systems, laboratory instruments, and other third-party applications for your future reference.

Evaluate Vendor Expertise

It's time to do your research and create a shortlist of technology vendors for demos and evaluations. During your search, consider not only the technical software features, but also the expertise and partnership capabilities of the vendors. A LIMS provider with a proven track record in your industry is more likely to understand your lab's unique challenges. Customer review sites like [G2](#) provide good insight into how users would rate their software investments.

Review Training Programs, Support, & Maintenance

Discuss the training and support that will be provided during implementation and beyond. A detailed training program and ongoing support are crucial for the successful integration of the LIMS into your lab operations. Assess the vendors' approach to maintenance and updates. Vendors committed to proactive maintenance keep systems current, secure, and aligned with industry standards.

Seek a Long-Term Partner

Ideally, the LIMS you select will set your lab up for success for the next decade and beyond.

Look for a partner with...

- A strong technical roadmap for the years ahead
- Plans to make strategic investments in emerging technologies
- Adaptability to the changing needs of your business

Assess the businesses plan for the next 5-10 years, the availability of training resources, and the vendor's commitment to user support.

Questions to Ask During Vendor Evaluation

- How does this LIMS align with our specific industry requirements?
- Can the LIMS seamlessly integrate with our existing systems and instruments?
- How scalable is the LIMS, and can it accommodate the growth of our laboratory operations?
- Is the LIMS flexible enough to adapt to evolving business needs and changing regulatory requirements?
- How can the LIMS support our compliance initiatives and deliver strong data security?
- What is the roadmap for future enhancements and updates?

Implementation

You've selected your LIMS. Now what? First, take some time to give yourself credit for planning and documenting your user requirements like we recommended above. These will be invaluable to you throughout the implementation process. The LIMS should be your lab's technical backbone, and as such, it is vital to have a thorough understanding of the lab's needs, processes, and the areas of greatest impact.

Planning Your Implementation

Getting started too quickly on the implementation without a plan will hinder your ability to meet your goals within the allotted time and budget. This is why it is so important to document your lab's requirements and workflows prior to vendor selection, as it will help you kickstart the implementation process.

- **Build a plan** for risk management and mitigation.
- **Include buffer timing** in your plan to allow for any issues that arise.
- **Be transparent** with the team up front about the plan, timeline, and workflow adjustments that will be taking place.

Data Cleanup and Migration Planning

Your data is your organization's most important asset. Consider whether migrating data should be your first step. There may be incompatibilities between your legacy data structure and the new LIMS, such as redundant values requiring repeated entries in different fields.

Understanding both your old and new data models will provide insights into the time and effort needed for migration and the benefits of transferring old data to the new system. Once you decide on a migration plan, begin by cleaning the data of inaccuracies, errors, and redundancies.

Training Your Team

Change is challenging, even in the most agile workplaces. So, it is important to start your transitional training as early as possible. Involve key team members in the planning stages, especially when collecting the processes you want to digitalize with a LIMS. This involvement can generate excitement about the new system.

Expect some skepticism and caution towards new technologies. Maintaining open communication with those who are skeptical, particularly during planning, helps you develop a more precise set of LIMS requirements and address any misunderstandings about its functionality early on. At the start of training, remind everyone of the overall business value of the LIMS implementation and outline the roll-out plan with milestones.

Overcoming Implementation Challenges

Ultimately, no implementation is perfect, no matter how much planning you do. Throughout the implementation process, transparent communication with your LIMS partner will be essential. This is why it is imperative you select a partner who you trust, as well as whose technology meets your needs.

In collaboration with your LIMS partner, be clear and upfront about expectations, timelines, and goals to ensure alignment. There will always be unforeseen circumstances and bumps in the road. With the right partner, you will be able to collaborate to overcome those obstacles together.

LIMS Best Practices

Deployment Options

LIMS implementations are challenging enough without worrying about the right IT infrastructure. Unsure which hosting option suits your needs? **Generally, it boils down to two different options — cloud deployment or on-premise deployment — with nuances to each. There are benefits to both options, such as:**



Cloud Deployment

- Shift your IT infrastructure cost to your vendor
- Quick to launch
- Hosted on validated infrastructure
- Updates, maintenance, security, and disaster recovery performed by cloud provider
- Maintain your ability to configure the solution to meet your needs



On-Premise Deployment

- Full control of software and data
- Highly configurable
- Hosted on your on-site servers
- Managed by your IT infrastructure
- Complete oversight of security measures, updates, maintenance, and disaster recovery

Customizable vs Configurable

There is some debate between in the world of software over which is better: Customization or Configuration. Customized software is built according to an organization's specifications, which at first might sound ideal. However, customized software is difficult to scale and challenging to maintain and in turn, expensive. Further, the more customized the system, the farther it gets from its true purpose and value, oftentimes turning into a much more complex Frankenstein system that is difficult to use.

Configurable software, on the other hand, allows you to design or adapt the solution to meet your needs.

Doing so enables organizations to keep current with software trends and work within industry best practices. It is also simpler, faster, and less costly, allowing you to achieve ROI realization quicker.



Data Security

In today's interconnected world, data security is of utmost importance, especially when you are managing information that provides your company with a competitive advantage and enables you to secure your IP. **With a LIMS, you can implement security measures to protect your IP and sensitive information, such as:**

- Regular password security upkeep
- Firmly defined user privileges
- Access controls
- Robust data backup and recovery mechanisms
- Proper disposal of digital files

By enabling better control of information access rights, LIMS can also help minimize the risk of a data breach through encryption.

Compliance

LIMS can certainly support and help with regulatory compliance, but that is not the only compliance initiative that organizations must contend with. Internal compliance objectives or compliance with customer objectives can be much more difficult to meet, as they can vary greatly from product to product, site to site, and customer to customer. LIMS can support the management of your compliance objectives, simplifying your lab and quality operations and helping you deliver a higher quality product for your customers.

Consolidation

Some organizations find themselves operating across multiple, disparate LIMS, leading to inefficiency and the expenditure of precious resources. By consolidating on one consistent LIMS across labs, you can establish standards for proper data handling and support data integrity and accuracy. Having all your labs' data in one central hub will also provide your organization with a unified, holistic view of your data that sets you up for success when it comes to data security, simplified compliance, and cross-lab collaboration.

Supporting Technology

By integrating your LIMS with supporting technology, you can establish a complete lab informatics ecosystem that has the capability to support product development from ideation all the way through to commercialization.

For example, the STARLIMS R&D Quality Manufacturing Informatics Platform encompasses a LIMS and:

Electronic Lab Notebook (ELN)

Accelerate ideation and simplify experiment execution in R&D.



ELN

Scientific Data Management Systems (SDMS)

Streamline lab and quality data management with a centralized repository and simplify testing equipment integration.



SDMS

Advanced Analytics 2.0

Make critical decisions faster with better data.



AA 2.0

Lab Execution System (LES)

Perform SOPs precisely while at the lab bench and in the field.



LES

LIMS

The R&D Quality Manufacturing Informatics Platform

Case Studies

Here are some real-world examples of organizations that have implemented a LIMS and are reaping the rewards:

AGROCHEMICAL

Bayer AG transformed global crop protection lab operations.

“The regulatory authorities mandate meticulous management of our equipment, ensuring proper maintenance and thorough documentation of maintenance and calibration events. **This centralized oversight is efficiently managed through our LIMS, providing seamless coordination and control.**”

– **Tassilo Steffl**, Senior Business Solution Architect, Bayer AG



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Douglas Pharmaceuticals took a lean journey toward smarter labs.

KEY RESULTS

- **95% Delivery In Full On Time (DIFOT)**, up from 50%
- **50% reduction** in laboratory investigation reports
- **Spare capacity freed up** for other value-added lab activities
- **Improved competitiveness and security** in the market


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Carabao turbo-charged its energy drink quality control testing.

“We now have confidence in the complete, end-to-end traceability of our raw materials and final products throughout processing and sample testing, to ensure fully auditable batch genealogy. [Our LIMS] integrates with our existing ERP system and key manufacturing equipment and can approve continuation or stoppage of a process or batch release, dependent on test results received by the system in real-time.”

– Tawatpong Supikamolsenei, Quality Control Manager, Carabao Dang


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DuPont achieved a harmonized testing system by consolidating its global R&D labs.

KEY RESULTS

- **Single system for collaboration** across geographical barriers
- **Centralized, easily managed, and automated** workflows
- **Reduced manual effort** of documentation for lab personnel
- **Simplified and streamlined internal support** due to the reduced number of legacy systems


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Conclusion

Congratulations on beginning your search for a LIMS! We hope you found this playbook insightful and that you feel more equipped for your search. Selecting the proper LIMS for your lab and staying up to date on industry best practices will set your lab up for success for years to come.

If you have any questions about how STARLIMS can support your lab and help you reach your goals, [contact us here](#).

Calculate Your Potential ROI with STARLIMS