



How to Choose the Best LIMS for Your Lab

Laboratory Information Management Systems, or LIMS, are powerful tools for streamlining lab operations and throwing away spreadsheets forever. But with so many LIMS options on the market, choosing the perfect one for your lab's specific needs can be overwhelming. In this comprehensive guide, we'll cover six key factors to consider and practical tips for selecting the best LIMS for your lab.

Not all LIMS are created equal. We're walking you through practical tips to find the best LIMS for your needs and skyrocket your efficiency.

Introduction

A Laboratory Information Management System (LIMS) is software that helps labs manage and organize data, as well as track samples, workflows, inventory, billing, reporting, and instrumentation. LIMS first emerged in the 1970s and quickly gained popularity for their ability to improve data management. These custom systems moved records off manual ledgers and stored them indefinitely, but that's about all they could do, given the computational limits of the era.

Today, LIMS have evolved into sophisticated systems that support a wide range of laboratory activities, from sample management and quality control to data analysis and reporting. They're rich in features, networked across devices, and built with multiple goals in mind. Today, a LIMS can help labs grow their business with a wealth of features that can perform tasks that automate decisions, track compliance, monitor quality, reduce errors, and more.



These capabilities vary widely. As a result, it can be challenging to determine which ones benefit your lab the most. We're addressing six keystone components of today's LIMS: flexibility, cloud vs. on-premise servers, APIs, user-friendliness, workflow automation, and implementation timeline. You'll learn your options for each component and the circumstances that lend themselves to each choice.

The LIMS market has ballooned 42% since 2016 due to increased volumes of samples, regulatory compliance requirements, and pressure for better data analysis.

Every lab must consider all six components, but they'll each have different priorities based on their workflows. And that's OK. There is no wrong way to put these blocks together. Lab managers who keep their processes, needs, and staff center stage when determining which LIMS is right for them will have the best experience choosing and implementing a LIMS.

Considerations When Shopping for a New LIMS

Flexibility vs. Rigidity

When in-house IT departments worked primarily with custom, in-house LIMS, they tailored them to specific industries and workflows. For example, a homegrown agricultural LIMS would enable an agricultural lab to manage a few standard soil analyses, and a homegrown clinical LIMS would run diagnostic tests. They would track samples through testing and generate reports.



These systems were easy for staff to learn. However, they were narrow in scope. As labs expanded their services and adapted to new regulations, these systems required expensive and time-consuming updates. Maintaining these systems proved challenging for a variety of reasons. For example: no longer having access to the same personnel or third party that built the system or dealing with a system built on outdated platforms (e.g. an old version of Java or Windows).

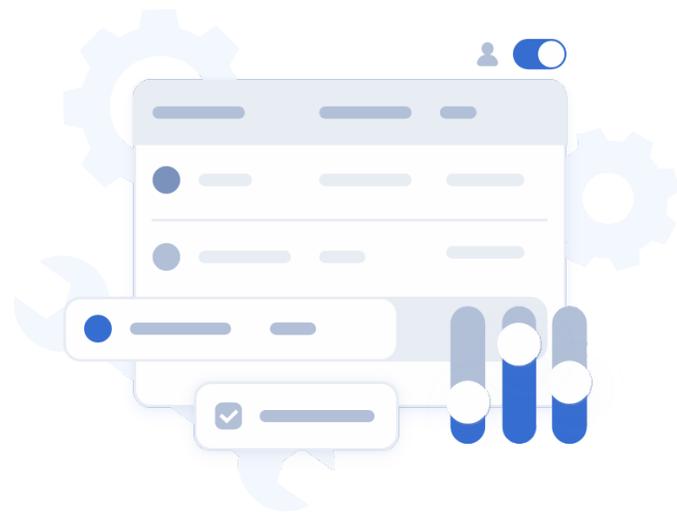
Legacy systems couldn't adapt, and labs added new software and processes to handle the changes. The lab environment became cluttered with multiple dashboards, ad-hoc programs, and increasingly complicated processes.

Today, some LIMS still have rigid workflows, requiring custom code when new needs emerge.

But other systems are built for change. That helps labs stay agile, adding processes to appeal to multiple segments of an industry or even expanding to a new one.

All labs face some change, and many LIMS offer some flexibility. Buyers need to consider their need for two kinds of flexibility: configurability and customization. What's the difference?

- **More flexible LIMS are highly configurable.** To configure a LIMS, users will not need coding skills. They can make changes right in the user interface. These are ideal for labs without internal development resources or for labs that have decided that hiring and retaining developers is not one of their core competencies. This approach allows users to design new workflows or update existing ones instantly. Users can add fields, save filters, and add tags to any data type they need.





- **More Rigid LIMS Rely on Customization.** Many LIMS are customizable but often require a software developer with experience (or even a certification) to work with their proprietary or non-standard APIs to customize the system effectively.

Some labs are served best with a flexible LIMS offering both high configurability and high customization. After all, more flexibility is seldom a problem. But a LIMS with little flexibility not only means lost business but can also result in low productivity and poor user adoption when specific options aren't available to staff.

Labs that face any of the following changes over time should consider a highly flexible solution:

- Business growth
- Increasing need to manage their platform internally
- New regulations in their industry
- Ongoing security certification audits
- Accreditation
- Changes in testing requirements

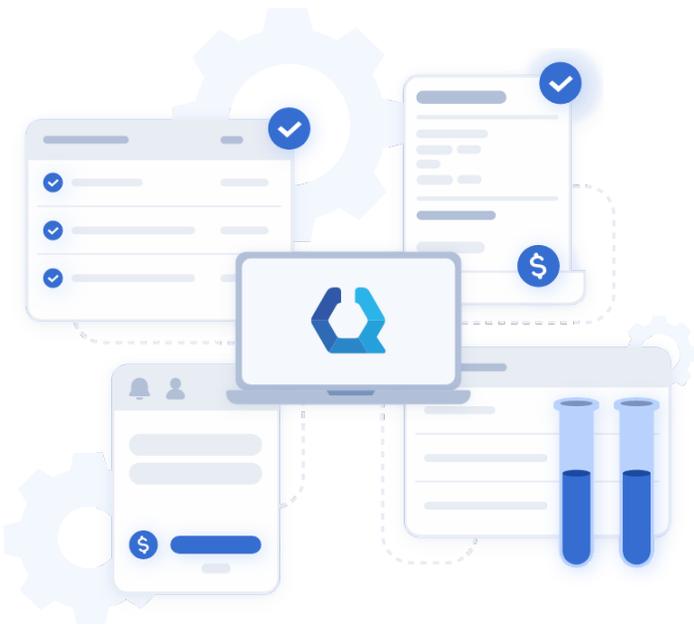
Cloud-based vs. On-Prem LIMS

Keeping servers on-premises (on-prem) means your lab will have more direct control over your hardware capabilities and the physical location of your data. After all, you own the servers and can control where they're installed and where they fit in your network.

That control comes with drawbacks. High upfront setup costs exist for on-prem servers and licenses, storage capacity, and upgraded broadband. You'll also need to dedicate a new physical space toward housing new infrastructure and hire IT staff to maintain it, including implementing and running security controls and procedures.

On-prem security often can't measure up to cloud systems, either. These systems can be slower to get security patches and are vulnerable to risks from connected devices.

In addition to capital costs, maintaining these systems comes with ongoing costs and commitments, from back-ups and data recovery to patches and cooling. To enable remote access (as is common with a modern and distributed workforce), you must have proper hardware and software (firewalls and VPN), or you risk exposing your corporate network to intruders.



The entire system will need upgrades every few years. You can manage some of these responsibilities with service contracts for support, but you'll want to ensure it's accessible. That's because you may need on-site help if you maintain security by foregoing cloud access to your system.

Another consideration of on-prem systems is that labs should use matching operating systems throughout the system to ensure compatibility and simplify maintenance.

On the other hand, a cloud-based SaaS solution means a third party owns the software you're using. Their experts handle security, backup, and IT staffing. This approach requires no licensing or ongoing compliance certification and no upfront capital costs. Multiple devices and operating systems can connect seamlessly for staff working remotely or traveling.

Instead of high upfront costs, the cost of a cloud system is spread over time, often paid via the number of users. Major upgrades get included, too. Not having to contend with support or security obligations can offer companies peace of mind and contain costs.



What kind of lab is the best fit for a Cloud-based LIMS?

- Labs whose security requirements don't require a locked-down, on-location solution
- Labs that do not already have strong IT teams that can handle the workload of an on-prem system
- Cash-wise labs
- Labs that are seeking tech-forward growth solutions

A Robust API for Better LIMS Experience

A well-documented, developer-friendly RESTful API means your LIMS can communicate with other software, eliminating double work and data entry errors. Think about which use cases you need:

1. **Instrument Integration:** Connect laboratory instruments with the LIMS for automatic integration and a comprehensive view of your data. Like freezer management, LabX, and plate readers, any instrument controlled by a software platform can be integrated. In that way, systems that do more than just talk—they share data in a deep capacity, including workflows.
2. **Data Import/Export:** Import or export data from external systems or to other systems. It allows you to move data from spreadsheets to a centralized platform where you can run tests, reports, or invoicing. You can even use AI to make better decisions about it.
3. **Report Generation:** Generate custom reports from LIMS data by integrating with external reporting systems.
4. **User Authentication:** Authenticate users of the LIMS alongside other systems that require user authentication.
5. **Pipelining Samples Post-sequencing:** So that secondary analysis is automatic.
6. **Dashboard Integration:** Integrate LIMS data with a dashboard or visualization tools. This enables real-time monitoring of laboratory processes and provides insights into lab performance.
7. **Better User Experience:** without opening multiple programs, a LIMS can perform tasks like connecting to your customer email platform and sending a notification once test



results are ready. It's instant, automated, and improves your relationship with customers.

Overall, an API increases the flexibility of a LIMS. But there are some circumstances when a robust API isn't necessary. If you don't have software and instruments to integrate, have only a few users, or have only simple workflows, you may not need a robust API.

Which labs should consider a LIMS with a robust API?

- **High-throughput laboratories:** Laboratories that process a large number of samples can use the API to automate data entry and streamline workflows resulting in faster turnaround times and added capacity to grow their businesses.
- **Multi-disciplinary laboratories:** Laboratories that perform multiple tests can benefit from integrating data from multiple instruments. They believe an innovative lab runs on efficiency and interoperability across systems so they can accomplish more.
- **Regulatory-compliant laboratories:** A robust API provides better tracking and traceability of samples and data, facilitating more straightforward compliance reporting.
- **Labs that integrate with external databases:** They can use API capabilities for sample tracking and management and streamlining data entry and analysis.

Any laboratory that values automation, integration, and efficiency in data management could benefit from a LIMS with a robust API. But in the end, they'll have to have the tech chops to integrate systems.



User-Friendliness

Configuring a LIMS To meet staff needs leads to greater internal control, simple changes, and high adoption. That means your LIMS will be better at doing its job, reducing errors, and boosting productivity.

Look for these components:

1. **Intuitive Interface:** A user-friendly LIMS should have a clear interface that is easy to navigate. Users should be able to quickly find the information they need and perform tasks without consulting a manual or receiving extensive training.
2. **Customizable Workflow:** A LIMS should accommodate a laboratory's unique workflow, including any specific data entry and reporting requirements. The LIMS should be flexible enough to allow the laboratory to customize workflows and configure the system to fit their specific needs.
3. **Simple Data Entry:** Data entry is a core function of a LIMS, and a user-friendly LIMS should have a simple and efficient data entry process. The system should be able to capture data quickly and accurately, with built-in validation checks to prevent errors.
4. **Comprehensive Search and Reporting Capabilities:** Can users search for and retrieve data easily? The system should be able to generate customized reports without requiring advanced technical skills.
5. **Responsive Support:** How responsive is the technical support team users rely on when issues arise? Support should be available when needed, and experts at resolving problems quickly.

Which labs should prioritize user-friendliness?

- Labs that benefit from making sure they enter data, label, and track samples accurately.
- High-volume labs, where errors and safety are paramount.
- Labs that hope to grow their sample volume without increasing errors.

Workflow Automation

Can you easily configure workflows and trigger process automations? What about adding new ones or changing existing ones? Do you want to save time by automating the consumption of inventory stock as tests run? Do you want to automatically run calculations, generate reports, and notify customers their results are ready?



You want a suite of tools to help you automate workflows and operations, including your client portal, billing, Quickbooks, inventory management, and quality management systems. The most configurable and flexible LIMS will include automations engines that allow you to trigger specific actions or data syncing based on events in the system.

Ask how important it is for your lab staff to add and alter workflows related to:

1. **Sample Tracking:** Can the LIMS automatically assign unique sample IDs and route samples through their lifecycle?
2. **Automating Data Entry:** Can the LIMS integrate with laboratory instruments or other external systems? Think about if you'll want to trigger actions in the LIMS based on events in other systems. For example, you could trigger the creation of a new sample record in the LIMS when a sample is received from a sample tracking system.
3. **Handling Electronic Signatures:** Can the LIMS automate electronic signatures for results and reports, allowing laboratory personnel to sign off on results?
4. **Calculating Results:** Can the LIMS automate the calculation of results, applying appropriate statistical methods and quality control procedures?
5. **Generating Reports:** Can the LIMS automatically generate customized reports from multiple tests and data sets across systems?

Most labs will be able to grow through automation, offloading repetitive tasks so lab talent can handle more complex work. Labs that benefit from a LIMS with workflow automation capabilities are labs where:

- Processes are complex, with multiple steps.
- Processes are already handled by machine systems and don't require manual processes to handle and interpret samples.
- The lab processes medium to high sample volumes, so automation results in significant efficiency savings.

Implementation

The implementation time of a LIMS (Laboratory Information Management System) varies widely depending on several factors, including the size and complexity of the laboratory, the specific features required, and the LIMS vendor's implementation process. But that doesn't mean interruptions to your lab are a prerequisite for implementing a LIMS that will add flexibility to your lab processes for years.

While it's common to hear industry stories of implementations that take a full year, you might be able to implement your LIMS in fewer than two months, certainly less than 12.

Look at the implementation process for a LIMS typically in all its phases, including:

- Project scoping
- System configuration
- Data migration
- Testing
- Training

Each phase can take anywhere from a few days to several weeks, depending on the scope and complexity of the project. Faster implementations cause less disruption and stress for stakeholders. And they don't have to limit the performance you get from a new LIMS. Ask



whether a LIMS team spends time upfront understanding your requirements, is responsive to your needs, and how much time it will take to transition to your LIMS.

Who should prioritize a speedy implementation?

- Labs with a compliance deadline
- Growing labs looking to ramp up their integrations and capacity quicker
- Labs in the process of switching LIMS vendors

Get More out of your LIMS with QBench

Overall, a lab that does not implement a LIMS misses out on the benefits of integrated laboratory operations, data management, and simpler compliance. A LIMS helps streamline laboratory workflows, improves data quality and traceability, and enables better decision-making based on accurate and reliable data.

QBench believes a LIMS should help your lab work smarter, with unparalleled flexibility to drive whatever the future brings. To dive deeper into which components of a LIMS are best for you, download our LIMS Evaluation Checklist.