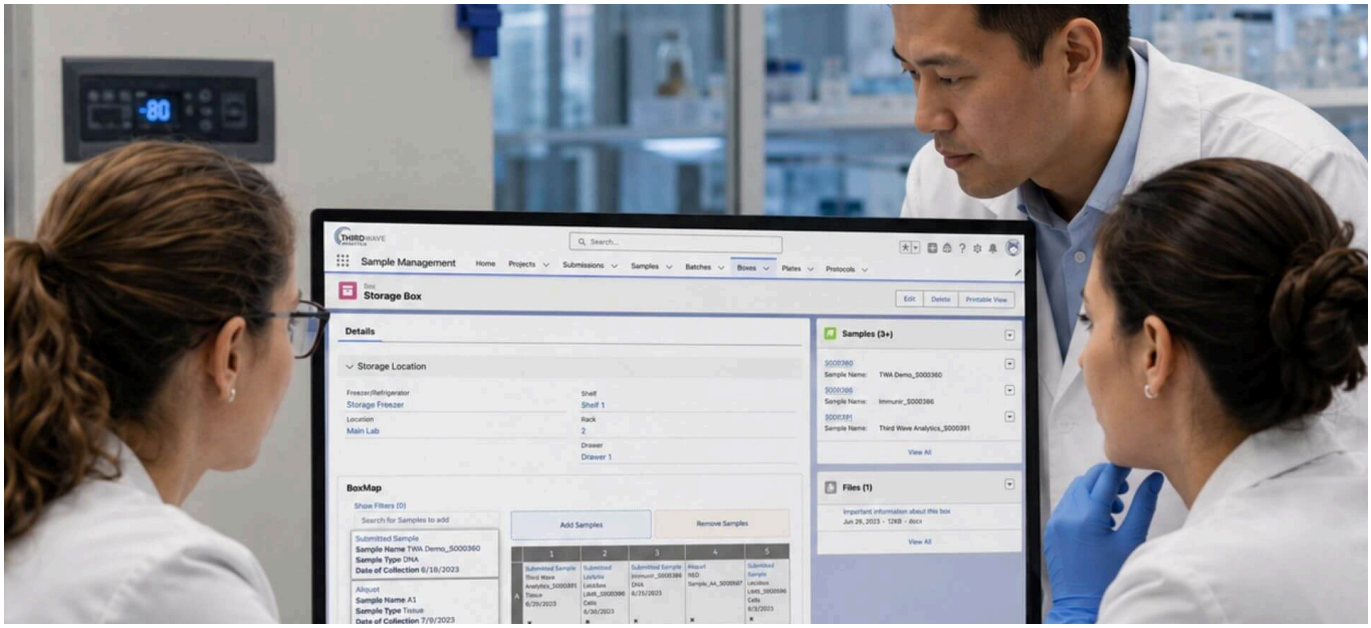
Choosing Biorepository Software: 6 Must-Have Features in a Modern Biobanking LIMS



What Should You Look for in a Biobanking LIMS?

Modern biobanks often manage tens of thousands or even millions of biospecimens across multiple freezers, facilities, studies, and research programs. As collections continue to grow, manually tracking samples with spreadsheets or disconnected systems becomes increasingly difficult and significantly increases the risk of delays and errors.

That's why scenes like this are still surprisingly common.

> **It's 4:45 PM on a Friday when a researcher calls asking for twelve specific plasma samples for a study starting Monday. Your team spends the next two hours combing through spreadsheets, cross-referencing freezer logs, and asking around to figure out who moved Box 14 last month. By the time the samples are located, it's after hours and everyone's asking why this keeps happening.**

This isn't an edge case, it's the daily reality for biobanks running on outdated systems, disconnected spreadsheets, or software that wasn't built for the complexity of biospecimen management. Every misplaced sample and every slow search doesn't just cost time. It costs

research momentum and, eventually, trust in your data.

Now imagine that same Friday afternoon call with the right system in place. A quick search by sample type and study pulls up all twelve specimens in seconds, complete with their exact freezer, rack, and box position. No spreadsheets, no phone calls, no guesswork—just an answer, and everyone's home on time. That's the difference the right Laboratory Information Management System (LIMS) makes.

Selecting a LIMS is one of the most important technology decisions a biobank can make. The right system should do much more than track where samples are stored, it should help you protect sample integrity, improve traceability, streamline laboratory workflows, and support regulatory compliance as your repository grows.

With so many LIMS platforms on the market, it's easy to get distracted by long feature lists and polished product demonstrations. The challenge is identifying which capabilities will make the biggest difference to your laboratory's day-to-day operations.

Whether you're managing a research biobank, clinical biorepository, or large biospecimen collection, your LIMS should simplify sample management rather than create additional work. It should be flexible enough to support your unique workflows today while scaling as your biobank grows, so you can expand your operations without reworking the way your laboratory functions.

If you're evaluating biobank software, here are six essential features every modern biobank LIMS should provide.

FEATURE 1

Configure Sample Records to Match Your Biobank

Every biobank collects different information. While one organization may focus on patient demographics and consent status, another may need to capture clinical observations, processing details, research data, or custom metadata unique to a specific study. That's why flexibility should be one of the first things you evaluate in a biobank LIMS.

A modern LIMS should allow you to configure sample records without changing your laboratory's workflow to fit the software. You should be able to create custom fields, organize information the way your team works, and display only the data that's relevant to each user.

Just as important, those sample records should remain easy to navigate. When users are presented with only the information they need, they spend less time searching through cluttered screens and more time managing samples efficiently.

Rather than expecting an “out-of-the-box” system to fit every workflow, look for a LIMS that can adapt to your laboratory. As your research evolves, your software should evolve with it.

FEATURE 2

Maintain Complete Visibility into Every Sample’s Storage Location

Knowing exactly where every biospecimen is stored is essential for maintaining sample integrity and keeping your laboratory running efficiently. As biobanks grow, manually tracking freezer locations, storage boxes, and freeze/thaw cycles quickly becomes time-consuming and increases the risk of misplaced samples.

Look for a LIMS that provides complete visibility into each sample’s storage history and current location. That means tracking more than just the freezer where a sample is stored. It means knowing its precise location, from the building and room to the freezer, rack, shelf, box, and even its exact position within the box. With every movement documented, your team can retrieve samples in seconds instead of wasting valuable time searching through freezers or spreadsheets.

In addition to tracking sample locations, your LIMS should capture metadata that helps preserve sample quality over time, including storage conditions, temperature, and the number of freeze/thaw cycles a specimen has undergone. Monitoring this information enables laboratories to assess sample integrity and maintain confidence in downstream research and testing results.

At a minimum, your biobank LIMS should allow you to track:

- Sample labels and barcodes
- Building, room, freezer, rack, shelf, and box locations
- Exact sample position within a storage box
- Storage conditions, including temperature
- Freeze/thaw cycle history
- Chain of custody throughout the sample’s lifecycle

Visualize Your Storage Environment

Just as important as collecting this information is how it’s presented. A modern LIMS should make it easy to visualize your storage environment through searchable inventories, freezer maps, and two-dimensional box layouts. The ability to quickly locate samples, print box inventories, monitor available storage capacity, and identify empty locations helps improve day-to-day efficiency while reducing the risk of handling errors.

The screenshot below shows how Lockbox LIMS models a laboratory's physical storage environment using configurable storage hierarchies. With its intuitive point-and-click configuration tools, administrators can create storage structures that mirror their actual facilities without writing a single line of code. Storage locations can be organized by building, room, freezer, rack, shelf, box, and position, while each freezer can be configured to match its unique layout. Lockbox also supports custom attributes for storage locations, role-based permissions to control freezer visibility, barcode scanning for rapid retrieval of storage information, and a complete history of every box and storage position associated with a sample. Together, these capabilities provide laboratories with complete visibility and traceability throughout the entire sample lifecycle.

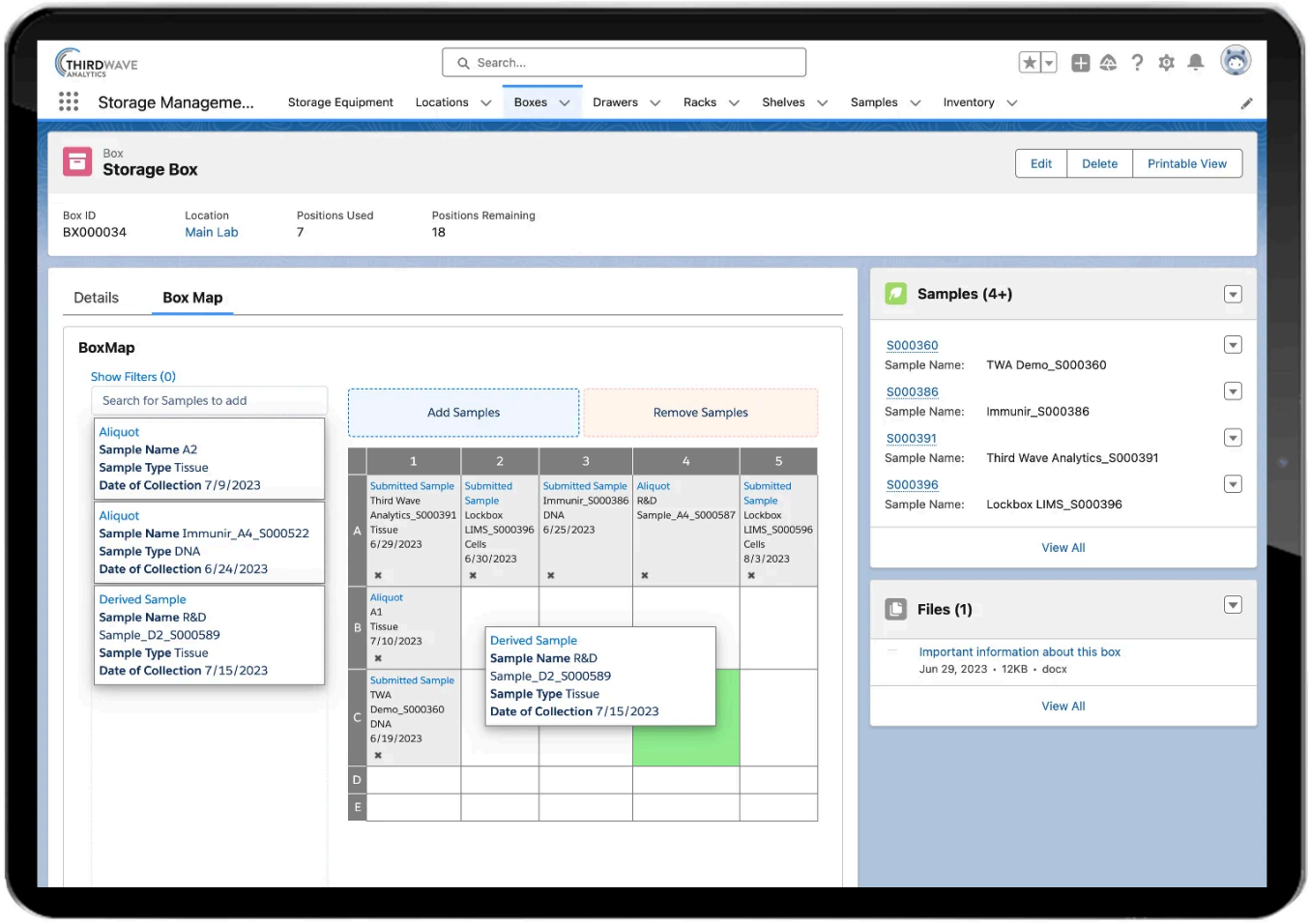


Figure 1: *Lockbox LIMS Storage Management module, Storage Box Feature. Lockbox LIMS visually maps storage locations, making it easy to locate samples and understand exactly where they reside within the storage hierarchy.*

Real-World Example

A university medical school implemented Lockbox LIMS to support its growing biobank by centralizing sample and storage management in a single system. Incoming sample manifests are uploaded in bulk using CSV import templates, helping the laboratory standardize data entry and efficiently manage large collections of biospecimens across multiple research projects.

Using Lockbox's configurable freezer storage hierarchy, the laboratory accurately models its real-world storage environment, from freezers and racks to individual boxes and sample positions. As samples are processed into aliquots and derived specimens, Lockbox automatically maintains parent-child relationships and a complete chain of custody, providing full traceability throughout each sample's lifecycle.

By combining flexible inventory management with automated sample tracking and lineage, Lockbox LIMS helps the laboratory maintain high-quality biobanking standards while supporting both clinical and research initiatives.

FEATURE 3

Automate High-Volume Sample Management

As your biobank grows, so does the amount of data you need to manage. Creating or updating sample records one at a time may be manageable for a small repository, but it quickly becomes inefficient and increases the chance of data entry errors when you're working with hundreds or thousands of biospecimens.

Ideally, your software should make high-volume sample management easy by allowing you to create, update, and manage multiple sample records at once. Whether you're importing a new collection from a clinical study or updating storage locations after moving samples to a new freezer, bulk actions can save hours of manual work.

One of the most efficient ways to manage large batches of samples is through standardized Excel or CSV import templates. A good LIMS should provide easy-to-use templates that include both standard and custom data fields, allowing you to import large amounts of information with minimal effort. This not only speeds up the process but also helps maintain consistency across your sample records.

In addition to bulk imports, look for a LIMS that lets you update multiple records directly within the application. Being able to modify groups of samples with a single action, rather than opening each record individually, can significantly improve productivity and reduce

repetitive tasks.

Modern biorepository software should also support API integrations with the other systems your laboratory relies on every day. Rather than manually entering the same information into multiple applications, a LIMS with robust APIs can automatically exchange data with electronic medical record (EMR) and electronic health record (EHR) systems, laboratory instruments, clinical trial management systems (CTMS), freezer monitoring systems, billing platforms, analytics tools, and other third-party systems.

By automating routine sample management activities through bulk processing, API integrations, and workflow automation, your laboratory can spend less time maintaining records and more time supporting research, clinical studies, and other high-value work.

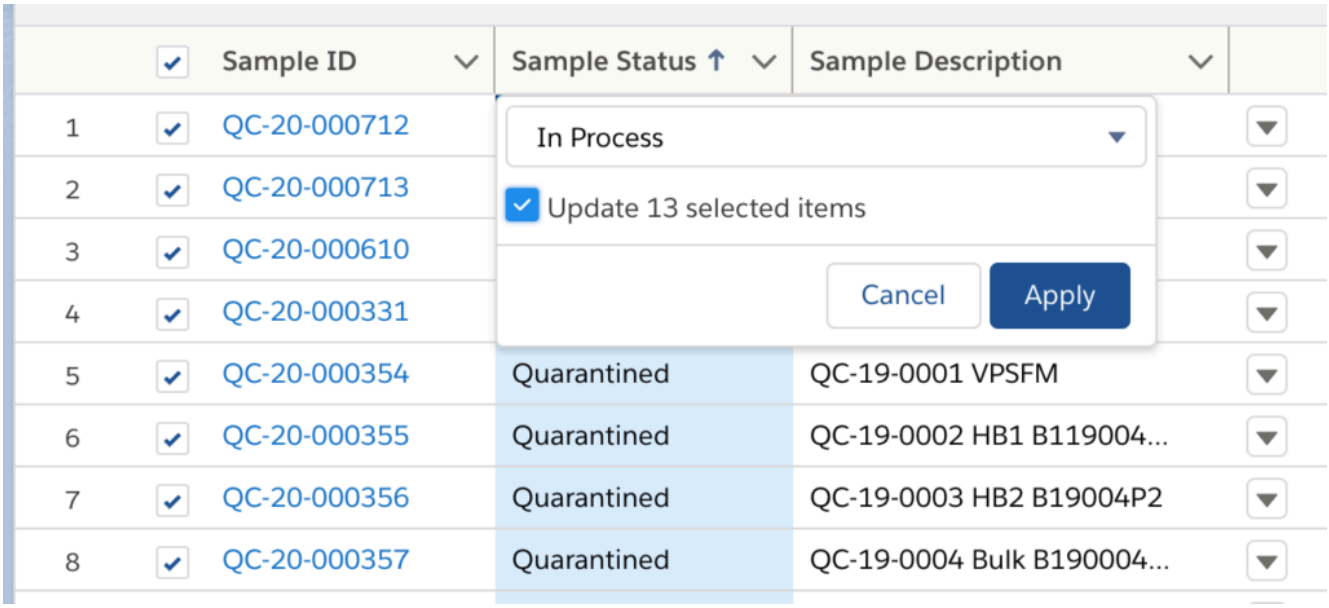


Figure 2: *Lockbox LIMS allows users to update the status of multiple selected samples simultaneously, helping laboratories process large batches of biospecimens more efficiently with a single action.*

FEATURE 4

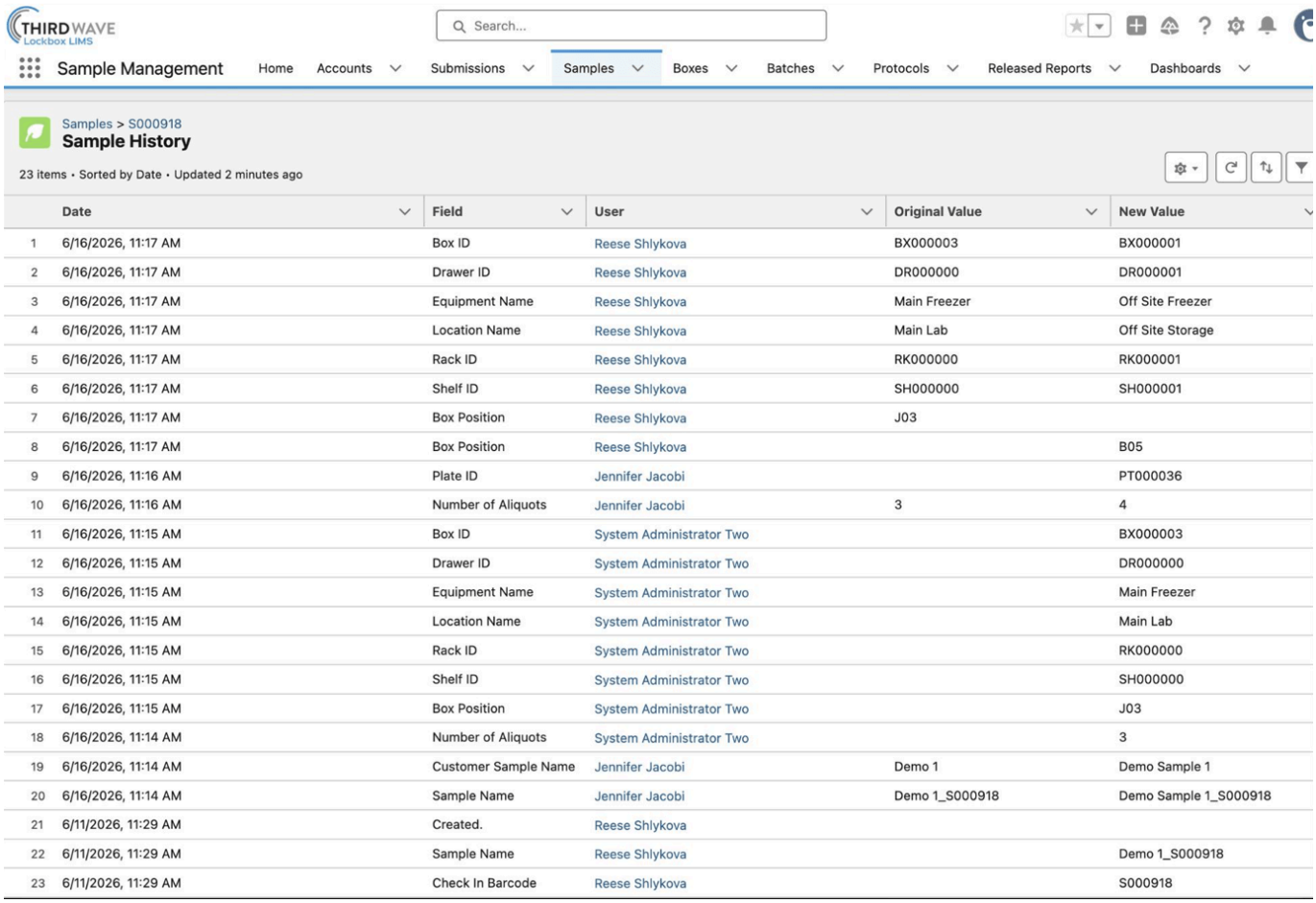
Protect Sample Integrity with Complete Audit Trails

Sample data doesn't stay the same forever. As samples move through your biobank, information such as storage locations, processing details, patient data, or other metadata may be updated. The key to protecting sample integrity is knowing exactly what changed, when it changed, and who made the change.

Your biobank LIMS should automatically maintain a complete audit trail for every sample record. Rather than relying on manual documentation, every update is recorded behind the scenes, creating a permanent history of changes throughout the sample's lifecycle. This helps laboratories maintain confidence in the accuracy of their data while providing the traceability needed for quality management and regulatory compliance.

The Lockbox LIMS audit trail shown below is an example of the level of traceability every modern biobank LIMS should provide. It captures important information such as:

- The original and updated values for each field
- Who made the change
- When the change occurred
- The complete history of every sample record over time



	Date	Field	User	Original Value	New Value
1	6/16/2026, 11:17 AM	Box ID	Reese Shlykova	BX000003	BX000001
2	6/16/2026, 11:17 AM	Drawer ID	Reese Shlykova	DR000000	DR000001
3	6/16/2026, 11:17 AM	Equipment Name	Reese Shlykova	Main Freezer	Off Site Freezer
4	6/16/2026, 11:17 AM	Location Name	Reese Shlykova	Main Lab	Off Site Storage
5	6/16/2026, 11:17 AM	Rack ID	Reese Shlykova	RK000000	RK000001
6	6/16/2026, 11:17 AM	Shelf ID	Reese Shlykova	SH000000	SH000001
7	6/16/2026, 11:17 AM	Box Position	Reese Shlykova	J03	
8	6/16/2026, 11:17 AM	Box Position	Reese Shlykova		B05
9	6/16/2026, 11:16 AM	Plate ID	Jennifer Jacobi		PT000036
10	6/16/2026, 11:16 AM	Number of Aliquots	Jennifer Jacobi	3	4
11	6/16/2026, 11:15 AM	Box ID	System Administrator Two		BX000003
12	6/16/2026, 11:15 AM	Drawer ID	System Administrator Two		DR000000
13	6/16/2026, 11:15 AM	Equipment Name	System Administrator Two		Main Freezer
14	6/16/2026, 11:15 AM	Location Name	System Administrator Two		Main Lab
15	6/16/2026, 11:15 AM	Rack ID	System Administrator Two		RK000000
16	6/16/2026, 11:15 AM	Shelf ID	System Administrator Two		SH000000
17	6/16/2026, 11:15 AM	Box Position	System Administrator Two		J03
18	6/16/2026, 11:14 AM	Number of Aliquots	System Administrator Two		3
19	6/16/2026, 11:14 AM	Customer Sample Name	Jennifer Jacobi	Demo 1	Demo Sample 1
20	6/16/2026, 11:14 AM	Sample Name	Jennifer Jacobi	Demo 1_S000918	Demo Sample 1_S000918
21	6/11/2026, 11:29 AM	Created.	Reese Shlykova		
22	6/11/2026, 11:29 AM	Sample Name	Reese Shlykova		Demo 1_S000918
23	6/11/2026, 11:29 AM	Check In Barcode	Reese Shlykova		S000918

Figure 3: *The Lockbox LIMS Sample History audit trail provides complete traceability throughout the sample lifecycle while supporting quality management, regulatory compliance, and data integrity.*

During audits, laboratories often need to identify exactly when sample information changed and who made the update. Lockbox LIMS automatically maintains a complete history of every sample record, giving quality teams the documentation they need without relying on manual logs or spreadsheets.

Having this level of traceability makes troubleshooting much easier. If a storage location is updated incorrectly or sample information is accidentally changed, your laboratory can quickly review the record history to understand what happened and verify the correct information.

Complete audit trails also simplify internal audits and regulatory inspections by providing clear documentation of every change made to your sample records. This level of transparency helps support compliance with standards such as ISO 20387, ISO 17025, CAP/CLIA, Good Manufacturing Practices (GMP), GLP, HIPAA, GDPR, 21 CFR Part 11, and other applicable regulatory requirements.

Ultimately, a detailed audit history turns compliance from a scramble into a formality. The documentation your team needs is already there, generated automatically as work happens.

FEATURE 5

Find the Right Samples Quickly with Powerful Search Tools

A biobank's value isn't measured by how many samples it stores, it's measured by how easily those samples can be found and used. A modern biobank LIMS should provide powerful search and filtering capabilities that allow you to locate samples using virtually any combination of data. Instead of searching through spreadsheets or manually reviewing records, you should be able to filter your inventory by sample type, patient demographics, clinical data, collection date, storage location, test results, or any other information your laboratory captures.

The ability to perform flexible, detailed searches helps your team:

- Quickly identify samples that meet specific research criteria
- Respond faster to sample requests from researchers and collaborators
- Assess available inventory before launching new studies
- Identify gaps in your biospecimen collection
- Export search results for reporting, analysis, or collaboration

As your repository grows, efficient data retrieval becomes even more important. A well-designed search experience saves time, reduces manual effort, and helps ensure valuable biospecimens don't go unused simply because they can't be easily located.

When evaluating biobank management software, don't just ask whether it can store your sample data, ask how quickly you can find the information you need. The ability to search, filter, and retrieve biospecimens efficiently can have a significant impact on your laboratory's productivity and the success of your research programs.

FEATURE 6

Study Management and Secure Research Collaboration

A biobank's role extends far beyond storing biospecimens. Every sample is collected to support a specific research study, clinical trial, or scientific initiative, making it essential for your LIMS to manage the relationship between studies, participants, and samples in one centralized system.

Look for a biobanking LIMS that allows laboratories to organize biospecimens by study while capturing important study-level information such as principal investigators, protocols, enrollment status, collection sites, funding sources, participant information, and associated documentation. Connecting samples directly to studies improves traceability, simplifies reporting, and enables researchers to quickly identify specimens that meet specific study criteria.

Protect Sensitive Research Data

Many biobanks manage protected health information (PHI) and other sensitive participant data that require strict security controls. Your LIMS should provide configurable role-based permissions so users only have access to the information necessary for their responsibilities. Features such as field-level security, encrypted data, comprehensive audit trails, and electronic signatures help safeguard participant information while supporting compliance with HIPAA, GDPR, 21 CFR Part 11, and other applicable regulatory requirements.

Search Across Study Metadata

Finding the right biospecimens often requires more than searching by sample ID. A modern LIMS should allow users to search across both sample records and study metadata using combinations of criteria such as study name, diagnosis, specimen type, collection date, principal investigator, collection site, consent status, participant demographics, or custom metadata fields. Powerful search capabilities help researchers identify eligible specimens faster, support cohort selection, and accelerate research without manually reviewing thousands of records.

Empower Researchers Through a Secure Portal

Many biobanks collaborate with researchers across departments, institutions, or external organizations. A secure researcher portal allows approved users to search available biospecimens, submit sample requests, upload study manifests, monitor request status, access study documentation, and download approved reports, all without requiring direct access to the laboratory's internal LIMS. Self-service access improves collaboration while ensuring sensitive research data remains protected through configurable permissions and security controls.

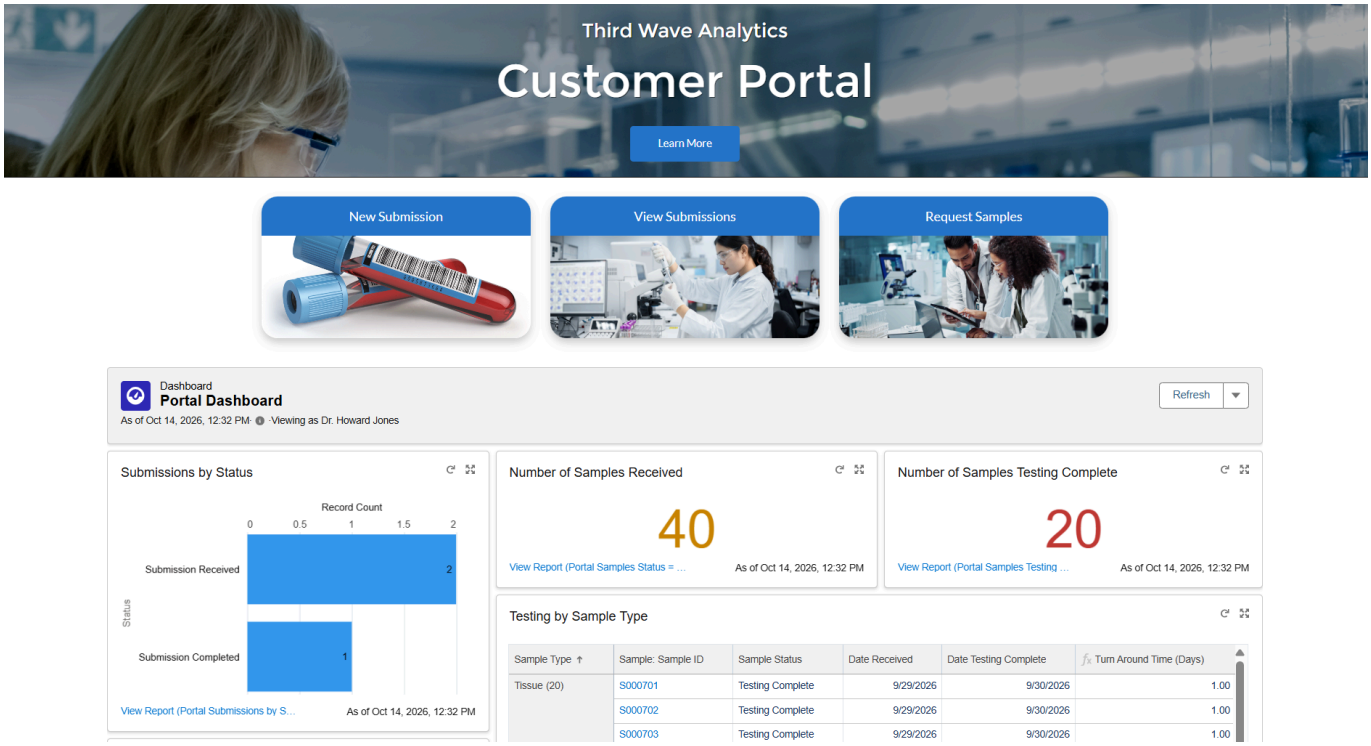


Figure 4: *The Lockbox LIMS Customer Portal allows approved users to submit sample requests, upload manifests, monitor request status, and access reports through a self-service interface. This improves collaboration while reducing administrative workload and protecting sensitive research data through configurable role-based permissions.*

Customer Spotlight

Before implementing Lockbox LIMS, BioScience Laboratories managed study participants and research activities across multiple systems, including Excel spreadsheets, Word documents, and Microsoft Access databases. Keeping everything synchronized took significant time and effort, making it difficult to efficiently manage studies as they grew.

By moving study management into a single, configurable platform, the laboratory streamlined participant screening, recruitment, physician review, health information management, and study tracking. Processes that once took one or two days—such as reviewing participant health information and generating medical letters now take just minutes. **Subject qualification was also dramatically reduced, dropping from about three days to only 30 minutes.**

With less time spent on manual administrative tasks, the BioScience Labs team can focus on supporting more studies and advancing research. As one team member put it, **Lockbox LIMS "wraps up all the functionality we need into one program and it's easily customizable."**

Summary: Essential Biorepository Software Features

Choosing the right LIMS for your biobank is about more than finding software to store sample information, it's about investing in a solution that helps your laboratory work more efficiently, protects valuable biospecimens, and scales with you, not against you. While every biobank has unique workflows and requirements, there are several capabilities every modern biorepository should expect from its LIMS.

The right biorepository software doesn't just help you manage biospecimens it helps your laboratory respond to researchers faster, improve data integrity, protect valuable collections, and scale confidently as your repository grows.

Lockbox LIMS was designed to meet these needs by giving laboratories the flexibility, traceability, and automation required to effectively manage biospecimens throughout their entire lifecycle. With Lockbox LIMS, you can:

- **Configure sample records to fit your laboratory.** Create custom data fields and layouts that capture the information most important to your biobank without being limited by rigid, out-of-the-box configurations.

- **Know where every sample is, always.** Record detailed storage locations, storage conditions, freeze/thaw cycles, and chain of custody information so every sample can be quickly located and confidently managed.
- **Manage high-volume sample collections efficiently.** Create and update large batches of sample records using bulk import and update tools, reducing manual data entry and improving productivity.
- **Protect data integrity with comprehensive audit trails.** Automatically capture every change made to a sample record, including who made the change, when it occurred, and what information was updated, helping support regulatory compliance and quality management.
- **Find the right samples quickly.** Search and filter your biospecimen inventory using virtually any combination of criteria, allowing your team to respond faster to research requests, identify available inventory, and uncover gaps in your collection.
- **Connect your biobank ecosystem.** Integrate with EMR/EHR systems, laboratory instruments, and other third-party applications using robust APIs to eliminate duplicate data entry, improve data accuracy, and streamline laboratory workflows.
- **Support research with integrated study management.** Organize biospecimens by study, securely manage sensitive research data, search across study metadata, and collaborate with internal and external researchers through a secure researcher portal.

Whether you're managing a growing research biobank, clinical biorepository, or large biospecimen repository, Lockbox LIMS provides the tools needed to simplify sample management, improve operational efficiency, and maintain complete confidence in the integrity and visibility of your data.

See These Features in Action

The best way to evaluate a biobank LIMS is to see it working with your own sample types and workflows. Schedule a personalized Lockbox LIMS demo so our team can demonstrate how these six capabilities, and many more, can be configured for your laboratory's specific needs.