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# Labs of the Future

How to Choose a Laboratory Information Management System in 2023

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# Introduction

**In spite of spending millions on R&D labs and equipment, most companies don't pay the same attention to data produced by their most valuable assets. Adopting a modern system for managing lab data can send productivity soaring.**

If you're searching for a laboratory information management system (LIMS), you may already be acquainted with the downside of using traditional, isolated R&D software tools. We wrote this guide to help you shed old workflows and find the perfect system to support your company's future goals.

In it we'll walk through:

- **What to look for in a modern LIMS**

- **Questions to ask vendors before you buy**

- **How to manage lab resources, record experiment data, and run analysis on one platform**

- **How AI and machine learning are changing the way researchers work - and what that means for collecting data properly**

## Go from unstructured spreadsheets to a connected digital lab

Here's what to expect when you choose the right system to support your R&D workflows.

| THE PAST | THE FUTURE |
|---|---|
| **Outdated, manual R&D tools** | **The modern lab** |
| Data is burdensome and easily lost | Data is an easily searchable, evolving asset |
| Labs are managed using a disjointed set of tools | Every team member uses the same integrated platform |
| Mostly simple data tables and statistical analysis are used | Data creates insights and learnings instantly |
| Results are siloed and rarely used for future experiments | Each new experiment benefits from historical data and predictive insights |
| Each scientist works independently | Work is collaborative and highly visible |
| Experiment records are unreliable and incomplete | Experiments are repeatable due to consistently structured records |

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# What is a LIMS and why does it matter?

Materials breakthroughs over the last decade have led to exciting advances around products like smartphones, 3D-printed medical goods, renewable bioplastics, and tiny cube satellites that could drastically lower the cost of space exploration. Considering that today's researchers are operating in markets where innovation and problem-solving is expected to happen rapidly, a solution that speeds up R&D is a game-changer.

The definition of a LIMS can vary depending on the source and industry, but most can agree on the general functionality. **A laboratory information management system (LIMS) is software that helps you efficiently collect, organize, and share data from lab experiments.** This type of system lets scientists and researchers standardize and build upon their data, providing visibility and accountability at all steps in the testing process. Traditionally, LIMS were only meant to manage tasks and data collected in a lab, but newer solutions give more consideration to what happens earlier in the process. This helps them gain a more accurate digital fingerprint of the entire experiment.
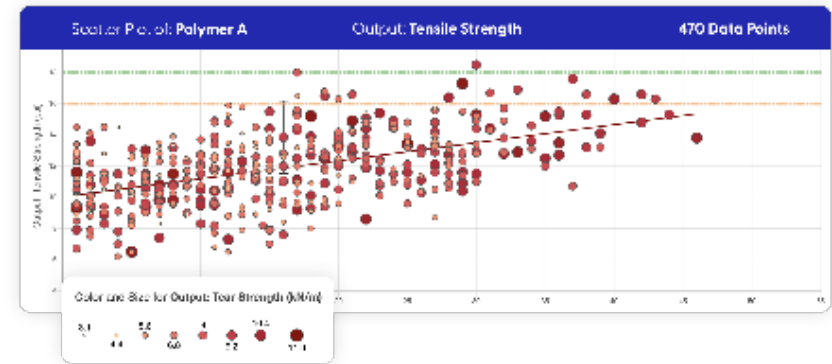


**The speed at which R&D is expected to deliver results is in direct conflict with traditional methods of collecting and sharing data.**

A modern LIMS doesn't just benefit the scientists using it today—it preserves vital knowledge for your organization and its future employees. **When a senior researcher leaves the workforce, decades of knowledge walks out the door with them.** A modern LIMS ensures knowledge accumulated across the length of a career remains accessible to the company long after each scientist leaves the field.

# Out with the old—how modern systems surpass traditional LIMS

New systems may fall under the same category, but they have distinctly different features and capabilities than LIMS of the past. Use this section to refine your criteria and thoroughly evaluate potential vendors.

A key differentiator between a traditional LIMS and a modern laboratory management system is its ability to build momentum based on past data. While any R&D team will benefit from keeping a clean record of their work for auditing purposes, some need more than that to drive breakthroughs  in their respective industries.

Companies looking to produce the most innovative, high-performance, or sustainable products can move faster if they have a solution that helps them learn from previous experiments. As you explore potential options, see if they offer capabilities around advanced statistical analysis and predictive technology on top of organizing and storing data for regulatory purposes.

## The core components of a modern LIMS

**To meet expectations head-on in the 2020s, researchers need to systematically record, share, and build upon the results of their experiments. As you evaluate potential new technology, check for several key features and components that make R&D, materials management, and lab operations work together seamlessly.**

## An intuitive, easy-to-use interface

Scientists have been using excel for decades, so whatever tool you adopt must be flexible, fast, and easy to use. Otherwise, you'll face a lot of friction and information loss as you adapt to new workflows. You can tell a lot by a demo or trial—does the user experience feel on par with other popular business apps? Will it be easy to learn if you're used to using spreadsheets? Try out a few common tasks and note whether things are where you expect them to be.

When it comes to the user interface, trust your instinct. If using the product seems unintuitive, it can be a sign that things are lacking under the hood as well.

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## Privacy and security features

The best way to approach access to information is through nuanced, role-based permissions that can be assigned to each user. Your new solution should allow you to build custom roles with granular options for viewing particular projects, settings, experiment details, and any other data you consider sensitive. This allows you to make the right information accessible while maintaining control over your R&D knowledge base.

## Secure, cloud-based infrastructure

Recording data in spreadsheets and storing it on laptops or shared drives should be a thing of the past. Your platform should be built on cloud-based technology by a well-known, ISO 27001 or SOC 2 certified provider, like AWS, and preferably be certified themselves. Confirm that you won't run up against storage capacity limits as data volume grows, and that remote workers can easily access real-time data.
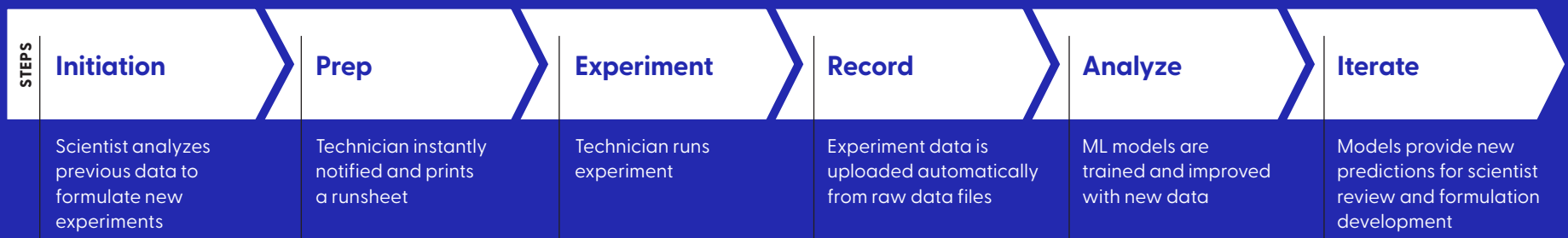
## Data that's fast and easy to query

A modern LIMS needs fast search and filtering capabilities to help teams examine past research and find data that will help them shape future experiments. You should be able to filter for various ingredients, lots, and their properties instantly, even when they're in the thousands.

## An API layer to connect with other tools

Any integrated platform must play well with the other systems that power your team's workflows. Ask if the LIMS you're considering is able to integrate with custom testing environments and normalize the data across different machines and systems. This ability allows modern LIMS providers to preserve data integrity even among large, distributed teams.

## The promised land: what it looks like when a LIMS just works

A modern system for lab and materials management allows your team to move through each stage of the R&D process smoothly, building their knowledge base with each new experiment.

**STEPS**

| Initiation | Prep | Experiment | Record | Analyze | Iterate |
|---|---|---|---|---|---|
| Scientist analyzes previous data to formulate new experiments | Technician instantly notified and prints a runsheet | Technician runs experiment | Experiment data is uploaded automatically from raw data files | ML models are trained and improved with new data | Models provide new predictions for scientist review and formulation development |

# 6 questions to ask your potential LIMS vendor

As you get down to the actual selection process, use this part of the guide to check off the requirements you need to meet your company's unique goals. It's helpful to write down your use case and discuss it with the research team first, including things like:

**What type of data is being recorded**

**What level of permissions each team member will need**

**How much customization you'll need**

**Whether your team is resistant to change**

**How your goals will evolve over time**

**What type of reporting and information sharing you'll do**

## 1

### Can I easily search real-time and historical data?

The best way to search isn't by sorting through old spreadsheets. Make sure your team can access data through easy-to-use graphical filters that return quick results. They should also be able to see data from all of your colleagues as they collect it, preferably in a single dashboard.

## 2

### Can I access all of my lab and materials data on one platform?

Many companies have multiple workflows and materials in R&D. This leads to varied data formats, duplicate entries, and researchers sharing data from different tools in a non-secure environment. To combat this complexity, confirm you can track materials inventory, access experiment results, and run reports in a single application.

**3**

## Can I add my own attributes and parameters?

To save time and empower other researchers to build upon your work, you should be able to customize the way you manage data. Ask vendors whether you can add your own ingredient and lot attributes, or define workflows and create templated test runsheets.

**4**

## Is it easy to communicate results to the right people?

A good LIMS makes it easy to both share and protect information as needed. Technicians should be able to collaborate together on the same experiments, but also have the option to restrict lab data using built-in permission controls. Reporting should be automated and standardized to ensure the right people have the data they need to move forward.

**5**

## How much time will this save my team?

Potential LIMS vendors should be able to discuss time savings and share customer stories about optimized workflows. The platform should drastically shorten the time you spend recording, searching for, and managing lab data.

**6**

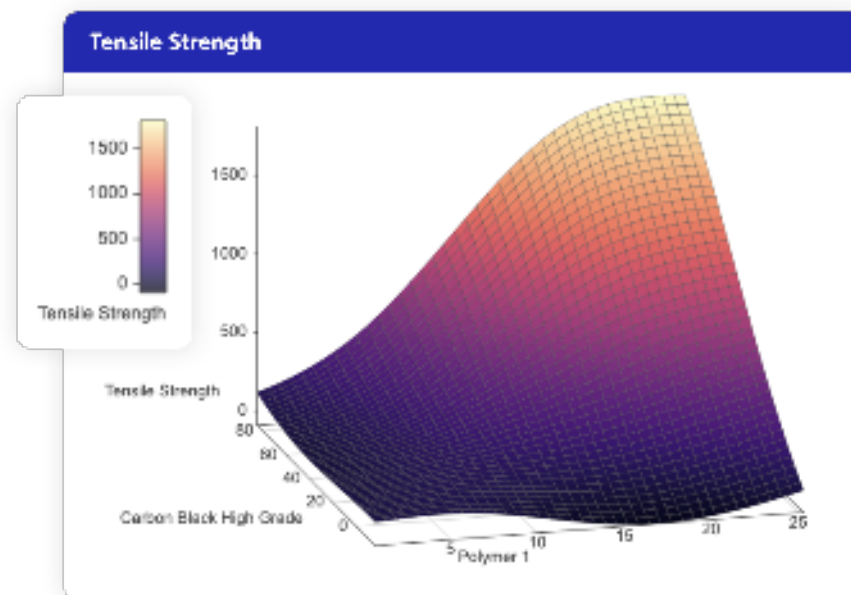## What kind of support will I get?

You'll get the most out of your LIMS when a strong support team is behind the technology. As you navigate the buying process, ask about the level of support you'll receive and whether you will have access to a dedicated account manager.

Having fast and reliable support partners will make it easy for researchers to adapt to the product, get work done faster, and address any issues that arise.

# The rise of advanced, AI-enabled LIMS

Today there are a few factors that make the best solutions stand out from the rest—in fact, they even make it possible to get the functionality of several traditional systems in one. Whether you're looking for a LIMS, an electronic notebook tool, or a way to manage your materials inventory, you can benefit from recent advances in AI and data infrastructure.

At Uncountable, we took the core functionality of a LIMS and an electronic lab notebook (ELN) and infused it with advanced machine learning algorithms, integrated statistical analysis tools, and several collaborative workflows to create a new kind of platform for researchers.

# How Uncountable improves R&D and informatics with AI

**Machine learning makes it possible to get faster insights from chemicals R&D data, letting you outpace the competition by learning more from each experiment you run. The Uncountable platform allows for both flexible data structure and ease of use, employing machine learning models to provide tailored predictions for every customer application.**

Here's how it works:

New relationships among data are uncovered by sophisticated machine learning models that can simulate hundreds of experiments, saving countless hours of lab time.
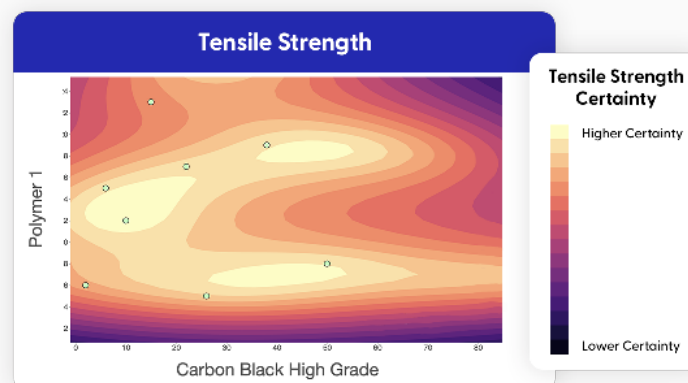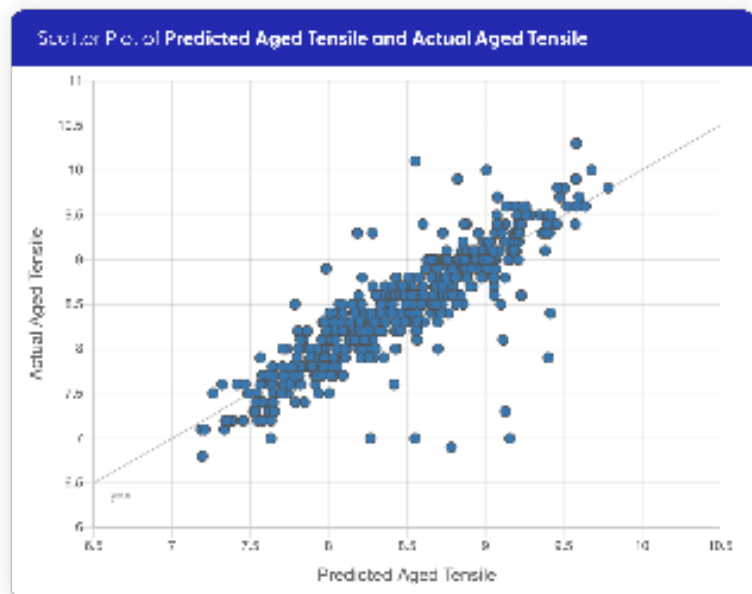




Custom models provide predictions, leveraging each new experiment and including data from different projects.



With each new experiment models can be updated and improved, growing in complexity and predictive accuracy.

"**With the Uncountable platform, analysis and reporting that used to take hours or days now takes minutes.**"

—

**Mike Recchio**, President and CEO at Zeon Chemicals LP


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# The key to successful implementation and adoption

Once you've chosen a new system, focus on setting up the right data structure and workflows to get the most value from your investment. Your vendor should help with this from start to finish, identifying key stakeholders and labs and loading data into the platform with the correct structure.

You can move the process along by providing lists of all ingredients and materials currently used in your labs. Explain your processes clearly to the onboarding team—they'll help you create the right permissions and communication pathways for each user. The more closely your team can work with your new lab management provider, the better you can accelerate adoption and ultimately get new products to market faster.

The lab of the future won't run on the same technology researchers have been using for decades. While searching for a LIMS is a good first step to initiating large scale improvements to your materials workflows, it's important to think even bigger. An AI-powered platform with statistical analysis tools built in allows you to work collaboratively and quickly, building on your whole team's data to launch innovative products for your customers.

## Ready to future-proof your lab?

Book a personalized demo of Uncountable's industry-leading LIMS solution and find out how our modern LIMS platform accelerates R&D so you can start innovating faster, and more intelligently, today!

**Book Your Demo**

## Learn more at uncountable.com

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