

LIMS vs ELN: Converged on Features, Not on the Unit of Work

Feature grids for the two categories now look nearly identical. The data model underneath has not converged, and adoption data from 2017 onward shows exactly where it still bites.

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IN BRIEF

In LIMS vs ELN terms, a LIMS is built around the sample and an ELN around the experiment, and that difference decides fit even though the feature lists have converged. Ask what your lab primarily produces: reportable results at volume, or changing protocols and interpretation. An LES sits between them, enforcing a fixed procedure step by step.

Key takeaways

- A LIMS is spined on the sample and an ELN on the experiment. Every feature either has added sits on one of those spines.
- A laboratory execution system enforces a fixed procedure step by step; in practice it is usually a capability of the LIMS.
- In a 2017 survey synthesis, 98 percent knew what an ELN was and 11 percent used one. The barrier was recurring cost.
- An institutional rollout of 52 labs found sample management adopted easily while some labs abandoned the notebook.
- Many labs need both, and that is normal. The expensive mistake is buying one and expecting it to do the other's job.

LIMS and ELN converged on almost every feature and stayed separate on the one thing that decides fit: whether the unit of work is a sample or an experiment. Buying on the feature list is how laboratories end up owning the wrong one.

The feature grids really are nearly identical. The data model underneath is not, and it surfaces the first time somebody asks a question the model cannot answer. This covers what each is built around, where the laboratory execution system sits between them, what a decade of adoption evidence actually shows, which industries get the most from a notebook, and how to read a product that claims to be both.

What are a LIMS and an ELN each built around?

A sample system organises around a thing that arrives, is split, is tested and is reported. A notebook organises around a thing that is attempted, described and interpreted. Every feature either product has added since sits on one of those two spines. The [LIMS resource hub](#) and the [ELN resource hub](#) cover each system on its own.

That is why the same word means different work in each. In a LIMS, “search” means finding a sample and everything attached to it. In an ELN it means finding the entry where somebody explained a decision. Both are search. Neither replaces the other.

The same divergence runs through every shared noun. A template in a notebook is a starting point somebody will edit; a template in a sample system is a specification that governs what may be entered. A version in a notebook is a revision of reasoning; a version in a sample system is a prior value the audit trail must preserve. Two products can list the same word on a feature grid and mean opposite things by it, which is exactly why grids stopped being useful for this decision.

What is a laboratory execution system, and where does it sit?

Between the two, and closer to the sample side than its name suggests. A laboratory execution system enforces a procedure step by step: the analyst cannot record step four until step three is complete, with the

specified reagent lot, the calibrated instrument and the values inside their limits. It is the electronic replacement for the paper test record or batch record in a GMP quality-control laboratory, where the method is fixed and the evidence that it was followed exactly is the product.

That makes it the opposite of a notebook. An ELN is built for work whose shape is not known in advance; an LES is built for work whose shape must not change. And it is narrower than a LIMS: it governs the execution of one test on one sample, while the LIMS holds the sample's whole life, the batch it ran in, the review and the report.

	ELN	LES	LIMS
Unit of work	The experiment	The procedure, executed once	The sample
Shape of the record	Free-form; the author decides	Fixed; the method decides	Structured; the data model decides
What it must never do	Force a structure onto reasoning	Let a step be skipped or a limit ignored	Lose a sample's identity or history
Where it earns its keep	R&D, method development, academia	GMP QC, regulated release testing	Any lab reporting results at volume

In practice an LES is usually a capability of the LIMS rather than a third product: the batch record and workflow enforcement functions of a sample system are what most laboratories mean by it. A lab that buys a standalone LES and a standalone LIMS has bought the same sample twice.

What does the adoption evidence actually show?

Vendors forecast ELN adoption. Researchers measured it, and the measurements tell a consistent story across a decade.

ELN ADOPTION, AS IT WAS MEASURED RATHER THAN FORECAST

2017

A survey synthesis in the Journal of Cheminformatics reported near-universal awareness of electronic notebooks against 11 percent group-level use, with 76 percent expressing interest. In its barrier table (n=169), ongoing system cost was cited by 93 percent and future development cost by 90 percent; the upfront licence, by 74 percent. The barrier was recurring cost, not ignorance.

2017

The same authors concluded that a screen still cannot be written on as accurately or as cheaply as paper in a wet laboratory, and that current systems could not fully replace the paper notebook. Their words: "We cannot currently hope to fully replace the paper lab notebook." The mechanism is physical: taking gloves off to type, laptops treated as spill targets, benches with nowhere safe for a tablet.

2020

A Swiss federal technical university's institutional programme, running since 2014, had 52 participating laboratories supported by 4.5 full-time equivalents. Its service manager reported that sample and SOP management were adopted easily; the notebook was the harder object, adaptation took weeks, and a few laboratories abandoned the notebook entirely while keeping the sample side.

2021

A shared-instrument facility at a national measurement institute concluded that neither an experiment page nor an accessioned specimen described what the facility did, and built its record around the instrument session instead.

2026

A major vendor's free academic plan still ships the notebook and molecular-biology tools without inventory or registry, by stated design, because those were built for industry's structured, consistent environment rather than for rotating academic groups.

Three things in that record are worth carrying. The first is that a successful pilot does not end at licence count: a recent English university trial saw more than 90 percent of participants want to keep the system, and 60 percent ask for dedicated in-lab machines so they would not contaminate personal devices. It ended at a capital request. The second is that in the Swiss programme, demand spiked in 2018 after the national

funder made a data management plan mandatory for grant applications. The third is the product boundary: a core facility that believes it already has the system has the notebook and the cloning tools. It does not have freezer locations, container checkout or recharge billing.

NOTE

The 2018 spike is a compliance trigger, not a productivity one, and it explains more adoption than any feature release. When a funder, a regulator or a client demands the record, the notebook gets adopted. When it is sold on efficiency alone, the paper book on the bench usually wins.

Which industries get the most from an electronic lab notebook?

Wherever the valuable record is the reasoning rather than the result. The pattern repeats across sectors, and so does the thing the notebook cannot hold.

SECTOR	WHAT THE NOTEBOOK HOLDS	WHAT STILL NEEDS THE SAMPLE SYSTEM
Pharmaceutical and biotech R&D	Hypotheses, protocol changes, abandoned routes, IP evidence with witnessed timestamps	Stability studies, release testing, the batch record under 21 CFR Part 11
Medical devices	Design history, verification reasoning, why a tolerance was set where it was	Lot traceability, incoming inspection, complaint samples
Chemicals and materials	Formulation trials, reaction conditions, safety observations	Certificates of analysis, specification testing at volume
Food and beverage R&D	Recipe development, sensory notes, shelf-life reasoning	Pathogen and allergen testing, lot holds, retailer traceability records
Diagnostics assay development	Assay design, validation reasoning, why a cutoff moved	The clinical run itself, patient results, CLIA obligations
Academic and core facilities	The experiment as it was actually done, for the paper and the thesis	Freezer inventory, instrument booking, recharge billing

In every row the notebook is the first system for the people doing the thinking and the wrong system for the people doing the reporting. A pharmaceutical or medical device organisation typically runs both, with the notebook in development and the sample system in QC, and an identifier crossing between them when a candidate becomes a product.

What still decides which one you need?

Ask what your laboratory primarily produces. Changing protocols and interpretation, or processed samples and reportable results at volume.

	START WITH AN ELN	START WITH A LIMS
Unit of work	The experiment	The sample
What varies	The protocol, week to week	The sample, not the method
The hard question	Why did we do it that way?	What happened to this sample?
What it will not do	Holding times, custody, certificates of analysis	Hold reasoning it has no field for

- The protocol changes more often than the sample type does
- The valuable record is why something was tried, not what the number was
- Work is often abandoned mid-experiment, and that abandonment is itself worth keeping
- People rotate through the group faster than any configuration survives
- Nobody outside the group ever receives a formal report

If most of those are true, you needed the notebook first. Concede the obvious: many laboratories genuinely need both, and running both is normal rather than a failure of selection. The expensive mistake is buying one and expecting it to do the other's job, which is how a sample platform becomes a filing cabinet in a research group and a notebook becomes an unusable system of record in a testing laboratory. Laboratory

informatics covers the five kinds of data that sit underneath both.

How do you read a combined LIMS and ELN platform?

Combined products exist and some are good. The question that tells you most is which spine the product was built on, because that is what its edge cases will reveal.

Ask for the edge case rather than the demo. How does it handle an experiment with no sample in the building? How does it handle one sample split across three studies? How does a protocol change three months in affect entries already written? How does a result reviewed in the notebook become a reportable value in the sample system without being retyped? The answers separate a notebook with sample fields from a sample system with a text box, and both are sold as the same thing.

Durability is the other question, and it matters more than it sounds. One researcher's published account describes a vendor acquisition after which links between experiments broke and analysis results became inaccessible. Ask what the export looks like, whether it includes the relationships between entries and not just the entries, and who owns the tenant if the vendor is bought. A notebook whose value is the connections between pages is worth very little exported as a folder of PDFs.

What a LIMS carries in this work

The sample spine, and the execution layer that runs on it. A LIMS holds sample identity, custody, holding times and the reportable result; its workflow enforcement is what most laboratories mean by a laboratory execution system. It does not hold reasoning, and it should not try to: a text box in a sample system is not a notebook, and a laboratory that treats it as one loses the connections between ideas that make a notebook worth having.

How LabLynx handles this

LabLynx is sample-spined. It holds sample identity, custody, holding times and the reportable result, enforces procedures step by step where a method is fixed, and the analytical configuration shows that shape in a testing laboratory. If what your laboratory primarily produces is experiments and changing protocols, a notebook is the first system to buy, and we would rather say so than sell you the wrong starting point. Where you need both, the identifier crosses between them once.

Frequently asked questions

What is the real difference between a LIMS and an ELN?

The unit of work. A LIMS organises around a sample that arrives, is split, is tested and is reported. An ELN organises around an experiment that is attempted, described and interpreted. Every shared feature — search, templates, versions — means different work on each spine, which is why feature grids look identical and the products still are not interchangeable.

What is a laboratory execution system?

Software that enforces a fixed procedure step by step, so an analyst cannot record step four until step three is complete with the specified reagent lot and a calibrated instrument. It replaces the paper test or batch record in GMP quality control. It is the opposite of a notebook, and in most laboratories it is a function of the LIMS rather than a separate product.

Why do so few academic labs use an ELN?

Not because they have not heard of one. A 2017 survey synthesis reported 98 percent awareness against 11 percent use, and the barrier table was dominated by ongoing system cost and future development cost rather than the licence. The same authors found that a screen still cannot be written on as accurately or cheaply as paper at a wet bench, so the paper book stays.

Do labs actually abandon electronic notebooks after adopting them?

Some do. An institutional programme at a Swiss technical university had 52 participating laboratories by 2020, and its service manager reported that sample and SOP management were adopted easily while the notebook took weeks of adaptation; some groups used it for only part of their staff and a few abandoned it while keeping the sample side. The sample half survived where the notebook did not.

If we have a free academic ELN, do we still need sample software?

Probably, and the vendor documentation says so. At least one major provider states that its free academic plan includes the notebook and molecular-biology tools but excludes inventory and registry, because those were built for industry requirements. A core facility running that plan has the notebook. It does not have freezer locations, container checkout or recharge billing, which is a published product boundary.

How should we evaluate a combined LIMS and ELN platform?

Ask for edge cases rather than a demo, because they reveal which spine the product was built on: an experiment with no sample, one sample across three studies, a protocol change affecting entries already written. Then ask about durability: what the export contains, whether it keeps the links between entries, and who owns the tenant if the vendor is acquired.

Sources and references

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Read the current version online

<https://www.lablynx.com/resources/articles/lims-vs-el/>

Downloaded September 23, 2026. LabLynx builds laboratory informatics software: LIMS, ELN, LIS and lab automation.