

The Pocket Guide to

Choosing a Laboratory Information System

 labOS

Your LIS

A Laboratory Information System (LIS) is the operation system of a medical laboratory. It manages all the processes within the lab including ordering, receiving, processing, and delivering results. It is also responsible for storing all information generated by the laboratory and making it accessible at all times. A good LIS software will boost productivity, improve turnaround time, and leverage the information that the lab receives for analysis and management.

Choosing the right LIS is the difference between a lab that operates smoothly, productively, and with a happy workforce; and a lab that will constantly waste time and energy on processes unrelated to business as usual.

The importance of choosing the right LIS

Government regulations and incentives are pushing healthcare services to be more competitive, this is especially true in the LIS market where customers expect top quality and innovation from their LIS provider, as well as a broad scope of services and features. In recent years, all laboratories have been required to adapt their information management focus and use a LIS to automate the routine steps in their daily workflow.

The transformation towards patient centered care means the flexibility with which these services are offered and the connection of a LIS to other devices is becoming increasingly important. Implementing a best-of-breed LIS system that supports complex workflows, while integrating with EMR/EHR systems,

becomes the need of the hour.

Laboratories come in all shapes and sizes

There is no shortage of factors to take into account when choosing a LIS, and every laboratory will have their own priorities in terms on what they need to focus on. A robust LIS will cover all a laboratory's needs, and be flexible enough to seamlessly accommodate changes and future growth. Don't compromise on the most important product in your lab!

Customer Service

It is not only the features of a LIS that are important to a lab. Customer service is an inseparable part of a LIS software, and finding a vendor who will support you through your implementation journey to

ensure business runs as usual is imperative. Finding a vendor with wide experience, a reputation for stability, a history of no downtime, and fast turnaround times is vital when choosing a LIS.

Be thorough in your selection process

Choosing the right LIS for your lab is game changing. No longer must lab workers drown in paperwork, do tasks manually that can be automated, and copy information between different systems.

This guide will walk you through some key terms when choosing a LIS, and offers a checklist of factors to consider before making this all important purchase. After reading this guide you should know more about what is important in order to lead the market in lab software, to introduce best practices in your lab, and to optimize healthcare and efficiency.

Cloud

Running a laboratory information system does not come without its headaches. Apart from having to maintain servers and the physical space they require, acquiring a new LIS requires setup and permanent maintenance. Laboratories need to ensure that there is permanent support on hand for cases of technological issues, upgrades, or unforeseen circumstances. The 'cloud' can circumvent all these issues, and brings laboratory technology in line with leading technologies in other fields.

The cloud is an internet based delivery system of computer power, database storage, applications, and other IT resources. Cloud based vendors maintain the hardware required for these application services, while clients use what they need via an internet connected

application or website from any device. One benefit of using this method is that companies can avoid the costs and complexities of owning and maintaining their own IT infrastructure, such as buying servers and updating operating systems and applications, by only paying for what they use. Popular and trusted cloud vendors which are also HIPAA compliant include Amazon AWS and Microsoft Azure.

In the laboratory, moving to a cloud LIS, ensures that the LIS infrastructure is managed by experts. Maintenance and updates are handled by the vendor's dedicated expert team. This can reduce the management load of operating a LIS, can increase security, and brings other potential technological benefits. There is no need for physical servers onsite – or

the space they require – which can reduce costs.

It is usually much easier and cheaper to scale when using the cloud as there are minimal overhead costs, and resources are readily available - virtually eliminating the element of risk.

Software as a Service (SaaS)

There are many reasons laboratories look for a new LIS – they may be looking to grow, create efficiencies, or enter the market with minimal risk. Laboratories need enterprise-grade software, without the hefty price tag, overheads, or specialized knowledge.

Whereas previously this would have been very challenging due to high infrastructure and licensing costs, with SaaS LIS models labs receive an out the box, best practice solution, with a pay-as-you go or monthly subscription, without the need for expensive purchases.

Software as a Service is a method of cloud computing in which a third-party provider hosts applications and distributes them to customers over the internet. The application is hosted at its data center,

and the customers access the application from a web browser. SaaS models are hosted in the cloud (see page 5). As such, SaaS subscribers benefit from a dedicated expert team, easy scalability, and minimal risk. The installation and implementation processes of a SaaS system are usually much quicker and simpler as the software environment stands ready for deployment. For many organizations this model is highly preferable, having the LIS cost as an operating expense (OPEX), rather than a capital expense (CAPEX).

Scalability

Businesses by nature are constantly looking for ways to increase revenue. An obvious way to do this is to scale a product or service and grow. The scalability of a LIS is its capability to expand in accordance with growing demand and increasing workloads. The more scalable a LIS is, the more flexible it is to workload demand.

If a LIS is scalable, it enables businesses to take advantage of its offering by allowing the business to upgrade current systems instead of replacing them, making the expansion easier to accommodate and more economically feasible.

Cloud and SaaS models will typically be more scalable, as they require minimal overhead costs.

Automation

A medical laboratory requires strict upkeep of many routine operations in order to function. These processes can range from complex clinical diagnostics or synthetic biology, to the simple movement and management of samples.

These processes need to be exact, but are repetitive and take up much lab technician time. Technology can offer marked benefits in terms of speed, precision, and quality; as well as user productivity, well-being, and focus.

Advanced LIS systems utilize technology to automate more and more processes within the lab, e.g. receipt confirmation, results validation, client reports and more.

In the future, this will only be further developed in labs with the integration of more artificial intelligence, to boost productivity and decision making.

User Experience (UX)

When laboratory managers search for a LIS, they expect more than stellar technology. A complex product such as a LIS must be intuitive and pleasurable for users, so that it enhances work-life, takes minimal time to understand, and does not interfere with business as usual.

User experience refers to the experience and interaction that an end-user has when using a LIS. This may be influenced by design, ease of use, and functionality of the product.

The user experience is heavily influenced by the user interface (UI), the screen through which a user navigates a software. A good or bad user interface can be the difference between a successful or unsuccessful LIS. A good user interface is one that enables the user to easily and effectively perform their intended actions.

Patient-Centric

Being 'patient-centric' is the process of designing a service or solution around the patient, to better empower them to manage their own health. The more information available about a patient, the better able a health provider will be to serve them.

With access to patient's history, a LIS system can provide a more accurate analysis, and a better service. A patient-centric LIS will ensure that there is one file for each patient – it may do this by automatically matching patients when new tests are ordered, and actively monitoring the system for duplicates to allow the merging of duplicate patient files. It will have tools in place, such as delta checks, to make sure to improve clinical decision making.

As the healthcare industry shifts to a value-based model, healthcare providers are shifting their focus to personalized healthcare (see page 31) of which a patient-centric LIS is a core basic. Patients also expect advanced technologies to close the gap between them and providers in terms of mobile access and POC devices (see page 26).

Purging & Archiving

You never know when a need will arise for a patient's medical history. Therefore, in offering good service, it is important to store and have access to complete historic medical data. State laws also govern that medical records need to be retained for certain periods of time.

Each LIS has its own limitation of how long data can be maintained, this may depend on factors such as: the system architecture, its infrastructure, or database. After that period of time, the data is either purged or archived, making it less accessible.

The more advanced a LIS system, the longer it will allow the availability of data. There are just a few LIS systems which are powerful enough to allow data to be available 'forever'.

Downtime

LIS is the heart of every lab and hospital. Ensuring patient data is readily available at all times, and that tests are properly managed is imperative in any medical environment. There is no space for unplanned gaps in operations, as apart from costs, it could have serious consequences for patients.

Most LIS products, like any other software system, will require downtime from time to time. This could be for a variety of reasons e.g. maintenance, backup, or upgrades. Unplanned downtime can also occur due to the malfunctioning of technical equipment or software. During the downtime period, the system is totally inaccessible or the access is very limited. It affects the lab's efficiency and its quality of service.

Advanced LIS systems will require little, if any, downtime. Advanced technology allows all maintenance operations to be performed while the system runs as usual. Thus there are no interruptions and performance is not affected.

Customizable

Everyone works differently, and as such tailored tools can greatly enhance productivity and user experience. Moreover, when it comes to the lab – permissions over data is necessary, both to adhere with data protection laws, and because not all information and functions are relevant to all users. This is especially true for LIS users, where different departments will focus on different areas, and processes. Some users may also have different requirements, or be limited by the different permission set by their lab.

A LIS that is customizable will allow different versions of the same LIS to be used within their lab, as defined by management or individual users. Different LIS systems will offer customization to various degrees.

If the LIS is powerful and flexible enough, general settings will allow customization of most features, and users should easily be able to 'tailor' the LIS to suit their individual behavior and workflow needs. More advanced systems will allow for greater levels of personalization, and more flexible settings – such that users can easily change their preferences at any point.

Database (DB)

A database is a crucial component of every information system including in the laboratory. Laboratories receive and process massive amounts of data as part of their daily operations, including patients' biodata, test results, medical history, etc., so using database software to structure and manage this data is essential.

While all laboratory information systems will rely on a database to function, the power of a LIS will be affected by the strengths of its database in terms of speed, security, performance, and stability.

For simplicity, most laboratory information systems will use a third-party database, although some will

prefer to create their own proprietary database. More advanced systems will usually use a standard database for its ability to integrate with third-party tools, accessibility, and for simpler maintenance.

Interface

Every LIS needs to communicate with several other systems - EMRs, HISs, reference labs, billing services, etc. Laboratory software also needs to communicate with many other devices, such as analyzers, sorters, robotic lines, and increasingly mobile and cloud-based applications.

In order to communicate with these systems and devices, the LIS uses 'interfaces'. The interface is the software that mediates between the LIS and the other party. Most of the interfaces are based on standard protocols, like HL7 and ASTM.

In many systems, the process of establishing a new interface is complicated and lengthy. However, if a LIS has a flexible interface engine, the vendor will be able

to provide a new interface within a short turnaround time. If the LIS has an open API and the software is simple enough, the lab IT team will be able to build interfaces by themselves.

Open API

A major challenge of transitioning to value-based care is the necessity for interoperability in an environment that until now has mainly functioned using silos. Healthcare interoperability is vital to this transition as it enables providers across the care continuum to coordinate care for patients and better influence the cost and quality of outcomes of patient care regardless of where the patient seeks treatment.

As healthcare IT infrastructure migrates to the cloud, and digital information becomes an industry standard, the need to accelerate interoperability has become urgent. Different data sets use different formats, making interoperability between apps challenging.

A LIS with an open application programming interface (API) will have an open intermediary between the LIS and other systems, allowing them to interact, and access the services of each other. It simplifies interoperability by providing healthcare professionals and users data more efficiently. This makes it easier to integrate with different and new technologies, such as point-of-care devices. A sophisticated LIS will use a standard API, giving programmers a consistent experience and minimizing their learning curve.

Point of Care (PoC)

Point of Care testing is when an investigation is taken at the place of patient care, either by a medical professional or by the patient with quick availability of results. These tests are usually simple, and can be empowering for patients as they can self-test in privacy of their homes. This means that diagnosis can happen much faster (sometimes immediately), and that treatment can be started promptly.

This is in contrast to a laboratory infrastructure, where specimens are sent away, and results can take days. POC testing is accomplished through the use of transportable, portable, and handheld instruments (e.g., blood glucose meter, wearables), and more simple devices

(e.g. urine strips).

POC technologies have the potential to improve the management of various diseases and conditions, as immediate clinical management decisions to be made. They are also beneficial in resource-limited settings where healthcare infrastructure is weak and access to quality and timely medical care is a challenge.

Mobile applications

Smartphones are already an extension of the arm, and an integral part of daily life. Indeed, the percentage of visits to applications from mobile VS desktop is steadily rising, and in some parts of the world (e.g. many parts of Africa) mobile usage exists where there would otherwise be no internet usage.

Mobile applications are types of applications that are designed specifically for mobile devices, such as smartphones and tablets. They can have many different purposes; some will require internet access to perform optimally, while others can be used without internet access.

Having access to certain aspects of a LIS on the move can heighten the efficiency of a lab, and offer greater patient care.

For this reason, advanced LIS systems provide accompanying apps to provide better support to doctors, patients, and phlebotomists.

Mobile applications allow physicians to access patients results from anywhere, to order lab tests remotely, and more. For example, being able to update data in relation to sample collection live, can save patients having to take blood tests twice.

They allow patients to access their own lab results, and apps for patients to track their own health (Point-of-care devices; see page 26). This allows doctors to monitor patient data live.

There are also mobile applications for couriers to communicate with their LIS in order to manage the phlebotomy process.

Middleware

LIS systems usually need to communicate with many instruments. Each instrument will have its own communication method and protocol. In order to handle this variety and complexity, many LISs use a third party system – middleware, to mediate between the LIS and the various instruments.

LIS systems with a more holistic approach will be able to handle these communication challenges without the need for any middleware, saving costs and time. The less middleware and components there are, the less moving parts; the system will be more flexible and maintenance will be simpler.

Personalized Healthcare (PHC)

Every patient has a different genetic makeup, medical history, and will have been effected differently by the environment. Recognizing these differences increases our ability to predict which medical treatments will be effective for individual patients, and which individuals are susceptible to certain diseases. Using this information to guide treatment and prevent future diseases is known as personalization.

PHC is a proactive philosophy that is focused on wellness, disease prevention and the precise treatment of disease. Genetic susceptibility to most chronic diseases are usually greatly impacted by the environment and usually progress over time. The current health care system is reactive and usually intervenes once

a disease is already prevalent and not-necessarily reversible. Apart from the suffering this causes it is also at great cost to the health system. As such, top strategies for healthcare providers are to transform their service to being more personalized. The aim with PHC is to detect risk and implement a program to prevent disease, or at least catch a disease at the earliest point where it can be detected so that an intervention can be put in place.

Version Release Management

LIS vendors, like all other software vendors, release new software versions from time to time.

A new version will usually include new features, infrastructure improvements, adaptations in response to regulatory changes, and bug fixes. Different vendors release new versions with different frequencies, ranging from every month to every several years.

The frequency of new releases is meaningful to labs, as more frequent releases means faster improvements for labs. In addition, frequent version updates usually means that upgrades are smaller and easier for labs to manage.

An advanced LIS will have frequent version releases and simple upgrade processes.

Upgrade

As with any other software, to stay current LIS software requires upgrades from time to time. How often and what is included in the upgrade will depend on the lab's needs and vendor policy.

Upgrades are a challenge for any lab - traditionally, they require system downtime for several hours or more. During this time, the service a lab can offer is very limited. Following this process, there is always some degree of uncertainty pertaining to understanding the new software and integrating it into business as usual.

A best-of-breed LIS will allow system upgrades with no interruption to business as usual in the lab and the service they offer. The new version is installed in

parallel to the existing one, with users gradually switching to the new version such that minimal disruption is caused.



The most powerful and trusted LIS

LabOS offers a unique and complete solution, which integrates all of your laboratory departments into a single database, including: Clinical Pathology, Microbiology, Anatomic Pathology and Genetics. From test ordering at the physician's office, through the lab's internal processes and client services, all the way back to result delivery and billing, LabOS gives you the tools to power your lab's success.

Customized Automation

LabOS excels in automating work processes by applying custom logic that ensures consistency and compliance with lab protocols. Extensive support for pre-analytical and analytical instruments,

efficiently routes work in the lab, while speeding up the work processes and reducing human error. Full integration of quality control, including live patient data based controls, patient results delta checks, and results cross checking, supports maximal auto-validation while ensuring unwavering quality. The system can automate the procedures of samples receipt confirmation, results approval, results delivery and more.

The Ultimate Patient-Centric System

LabOS ensures you provide your customers the superior service they deserve. With our unified and patient-centric system, your client services department will provide superior service. Clearly presented and accessible lab results and orders will lead to faster and better decisions. Plus, our real-time alerts

will allow for increased efficiency and enhanced communication between lab areas.

Support for multiple result delivery policies and methods, together with client-tailored result report formats and scheduled summary reports, means that you provide your clients with all of the information they need, wherever and whenever they need it.

Easy and Enjoyable Interface

With an interface that is task-driven and tailored to the users' needs, it focuses on simplicity, efficiency, and the availability of information, reducing human error and saving time. Customizable dashboards allow users and managers to monitor the loads and bottlenecks through counters, widgets, and graph displays.

The complete LIS for your lab's needs

Netlims is a leading global provider of Laboratory Information Systems (LIS), serving hundreds of hospitals and laboratories worldwide. Our success is based on our flagship product, LabOS, and our unyielding commitment to customer support. We oversee and manage every aspect of LabOS implementation, from gap analysis and planning, to installation and maintenance via 24x7 support.

If you have any comments or questions don't hesitate to reach out to us at: info@netlims.com.

Follow us on:

LinkedIn: <https://www.linkedin.com/company/netlims-llc/>

Twitter: @NetlimsLIS

Cloud	5
Software as a Service (SaaS)	8
Scalability	10
Automation	11
User Experience (UX)	12
Patient-Centric	13
Purging & Archiving	15
Downtime	16
Customizable	18
Database (DB)	20



**Have your cake
and eat it too**

 **NeTLIMS**
netlims.com



©