Laboratory information management system (LIMS)

The client/server tools had developed to the point of allowing processing of data anywhere on the network. Web-enabled LIMS were introduced the following year, enabling researchers to extend operations outside the confines of the laboratory.

LIMS was introduced in the form of a single centralized minicomputer, which offered laboratories the first opportunity to utilize automated reporting tools. The LIMS is an evolving concept, with new features and functionality being added often. As laboratory demands change and technological progress continues, the functions of a LIMS will likely also change.

LIMS have implemented extensive configurability as each laboratory's needs for tracking additional data points can vary widely. LIMS vendors cannot typically make assumptions about what these data tracking needs are, and therefore vendors must create LIMS that are adaptable to individual environments.

The web-based LIMS architecture is a hybrid of the thick- and thin-client architectures. While much of the client-side work is done through a web browser, the LIMS may also require the support of desktop software installed on the client device. The end result is a process that is apparent to the end-user through a web browser, but perhaps not as apparent as it runs thick-client-like processing in the background. In this case, web-based architecture has the advantage of providing more functionality through a friendlier web interface. The disadvantages of this setup are more sunk costs in system administration and reduced functionality on mobile platforms.

LIMS was developed as a system to keep a track of the movement of samples in a laboratory. Since then, LIMS has expanded to be an integrated solution for all laboratory data management needs including maintaining sample records, tracking of tests performed, managing customer services and managing invoices for the services rendered. This had led to the LIMS slowly replacing other laboratory data management solutions such as ELN (Electronic Laboratory Notebooks), patient portals, barcode management systems, accounting software, etc. Another key feature that most modern LIMS have implemented is a configuration tool. The tool makes the system versatile to meet your workflow requirements and match the terminology you use in your laboratory, eliminating the need for costly customization.

Function of LIMS

The most important role that LIMS plays in a laboratory is to increase the operational efficiency of the laboratory by automating and streamlining the workflows, eliminating the need for maintaining information manually and meeting regulatory guidelines. A good LIMS facilitates both easy record keeping and reporting, thus eliminating the risks of human errors and improving the overall turnaround time.

LIMS are equal but a well setup LIMS will help drive efficiency within the laboratory and integrate it with wider business functions. The key advantages of a LIMS include:

- Defining and enforcing standard workflows – ensuring procedures are always followed

- Eliminating transcription errors through instrument integration
- Integrating with other systems (ERP, Accounting) to increase process efficiency
- Reducing the management and reporting overhead of the laboratory - a single electronic repository for all operational data; making the paperless laboratory a reality
- Reducing costs and increasing productivity through more efficient working
- Supporting regulatory compliance including ISO17025, FDA 21 CFR Part 11, GxP

While not all organizations have to work to specific regulatory guidelines or standards many LIMS features designed to support compliance are relevant to the majority of laboratories. These include:

The additional advantages of a highly configurable LIMS include:

- The most appropriate (the best) LIMS workflow for every scenario, every time
- Easy for staff to learn and adopt
- User friendly system that aids their daily routines
- Elimination of unnecessary workflow steps and clicks through the system
- Faster, more efficient and more productive working
- Support for individual workflows per individual, group or location
- Supports a single user or multi-department and multi-national systems

The major advantage of a LIMS is that it provides a single platform for all laboratory activities, enabling all relevant information to be kept in one place, driving a paperless laboratory approach. Electronic interfaces allow analyzers, chromatographs, mass spectrometry and other instruments (simple and complex) to be connected and directly transfer test results to the LIMS. The resulting data is held in one secure database rather than a multitude of spreadsheets and notebooks. Many say though that real advantage of a LIMS is being able to easily search a single source of data for the information needed. Whether quickly re-printing a certificate of analysis or analyzing trend data from a specific test type over a longer period of time, the data can be extracted and visualized at the touch of a button.

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