



REVIEW ARTICLE

Implementation and Benefits of LIMS (Laboratory Information Management System) to Laboratories – A Review

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ABSTRACT

Laboratory automation is termed as a utilization of technology to streamline process workflow and substitute manual error and interventions of equipment and process. Laboratory information management system is a basic tool to manage sample and test for analytical QC, R & D laboratories and quality assurance providing integrated solution to workflow. Main aim of this paper is to introduce the implementational benefits of LIMS to quality control laboratories by sorting and organizing test information from sample inception till report dispatch. Common features of LIMS for quality control and quality assurance are set-up and configuration, sample management, vendor monitoring, ERP integration, document management link.

KEYWORDS

LIMS, ERP, Automation

INTRODUCTION

LIMS

Laboratory information management system is an automation in itself which saves tremendous amount of manpower, time and increases the work efficiency by reducing the chances of error caused due to manual interventions. With moving technology and automation of complete production units testing laboratories, R & D units and quality management system cannot be ignored of new development and improvements. LIMS can help managing informational flow within lab and connecting lab with rest of the organization. LIMS also act as a major repository of the test records and source of archive data keeping an audit trail to track date, time and users making it a robust system to satisfy quality

assurance and regulatory needs and maintaining data integrity. Practically LIMS can be interfaced directly to the analytical instruments, lab data and computer system and also to other application tool used within organization like ERP. Data capturing into LIMS can be done by several ways:

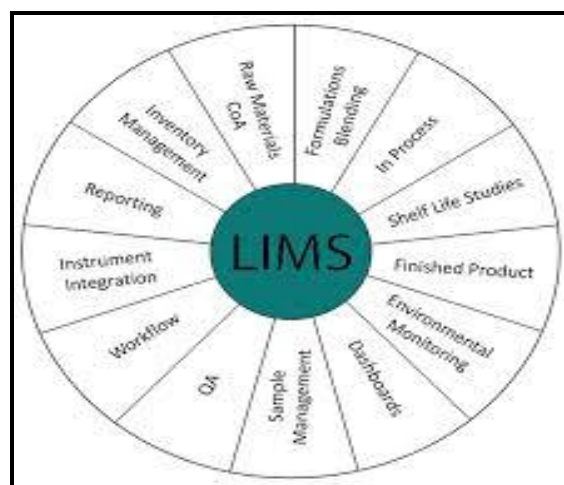


Figure 1: Diagram Shows LIMS Applications

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- Direct data capture from an instrument reducing transcriptional errors.
- Data captured from instrument with test method and interpretation and only results finally captured by LIMS
- All previous electronic data stored can be added to LIMS library.
- Test observations manually added or transferred to LIMS.

Key Benefits

- Entire information and data is stored at single safe place available just on a click.
- Paperless laboratory reducing work load on end user.
- Improved efficiency in productivity of super users.
- Reduction in transcriptional errors and manual handling defects.
- Automation of process from sample log in, easy sample tracking full batch traceability with ERP interface and data management.
- Effective TAT (turnaround time) with customer satisfaction.
- Integration of LIMS direct to instruments such as chromatography, pH, LC, UV, NMR etc.
- Collects and passes data from simple instruments, such as balances and meters, and can process before reporting to LIMS
- Collects and passes data from Complex PC-controlled instruments, such as High Performance Liquid Chromatography (HPLC) and Gas Chromatography (GC)
- Can be configured to deliver a work-list from LIMS to the instrument, and subsequently upload the results from the instrument to LIMS.
- Availability of data any time anywhere with no lab dependency.
- Easily auditable and compliant to regulatory norms. The database provides assurance of

the authenticity of the electronic data consistent with 21 CFR Part 11 and good Laboratory practice.

Market Dynamics

- As per the estimation of research report from \$ 848.5 million in 2014, the LIMS market will grow to \$1,323.6 million by 2019.
- LIMS market is still in a nascent stage, yet the software developers are trying to make the software user friendly and cost effective for which it has come up with the concept of LIMS on Cloud. It includes competitive benchmarking of the top players operating in the Indian LIMS market, features brief profiles of major domestic and foreign players in the market.
- Major market Players are Agilent Technologies India Pvt. Ltd., Birlamedisoft Pvt. Ltd., Caliber Technologies Pvt. Ltd., Labvantage Solutions Pvt. Ltd., Oasis InfoTech Ltd., Ocimum Bio solutions (India) Ltd., PerkinElmer (India) Pvt. Ltd., STARLIMS Asia Pacific Ltd., Sukraa Software Solution Pvt. Ltd., Thermo Fisher Scientific India Pvt. Ltd.

LIMS and ERP

Do laboratories need LIMS if they are already equipped with strong ERP tool? Laboratories work on different module other than a production units having different process workflow and procedures covering entire sample processing. It basically comprises of sample login, sample receiving, assigning analysis, sample testing till report generation including some of complex techniques like sample sequencing. Data handled in laboratories are of dynamic nature rather than static. It tends to change with ongoing time. ERP system is inefficient to handle these dynamic data changes whereas LIMS is configured to handle such changes without affecting rest of the business. Integrated LIMS-ERP can help in real-time decision-making capabilities to streamline data intelligence, mitigate risk, increase productivity and improve profitability across their supply chains.

Organizational Implementation

Key Feature for LIMS implementation in an organization is:

- a.) First step in a right direction while purchasing LIMS is to define user requirement specifications.
- b.) Prepare business process diagrams to clarify the relationships, process and workflows of your laboratory for the team to review prior to implementation.
- c.) Plan Business requirement and strategic planning like easier access for customers to access/review testing results, streamline the sample submission process, enforce common business processes, eliminate/reduce paper processes, reduce sample cycle/processing times, eliminate/reduce the amount of data transcription, effectively track work.
- d.) Customization may not be possible for everything but should be considered on priority to get desired best results for organizational benefits. It is better to inform your implementation team of the problems and shortcomings laboratory workers experience before implementation.
- e.) Leadership commitment and Management involvement is very essential for successful implementation.
- f.) Formulate a model that illustrates the major relationships between the laboratory data and information and review hardware configuration requirements.
- g.) Team training how to operate and understand the features in the system to increase productivity and efficiency in your laboratory
- h.) Validate the implementation and observe if you are getting desired results or not.

CONCLUSION

Concept of LIMS varies from organization to organization depending upon their nature of business. With increase demand of competency and technology LIMS is a perfect choice to bring automation in the laboratory and create a paperless environment with multiple advantages increasing efficiency, accuracy, customer satisfaction and minimizes error occurrence.

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