



REVIEW ARTICLE

Laboratory Information Management System (LIMS): A Review

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ABSTRACT

Laboratory Information System (LIS) streamlines workflow in the laboratory and eliminates time-consuming paperwork. The business today is getting increasingly pressured to be more productive and efficient with less traditional resources. If we look at a typical production process, for instance, the level of automation and optimization that has permeated into the production floor is quite astounding. Many industries have had a tremendous impact in bringing to the market the automation and optimization solutions to streamline -the production floor. The other ends of the spectrum are the back-office transaction oriented processes like Inventory Management, Materials Management, Financials and so on, Therefore a lab's ability to process data quickly and its ability to disseminate that information efficiently throughout the plant is vital for the success of the production process. Laboratory Information Management System (LIMS) can help in managing the information flow within the lab and can be the modus operandi of connecting the lab with the rest of the organization. For instance, imagine all the information that is generated in a lab.

KEYWORDS

Automation, optimization, laboratory management.

INTRODUCTION

The modern laboratory exists in an environment that produces a large amount of data. With the advent of new technologies, both the quality and quantity of information is increasing exponentially. This increase of data can cause significant problems and methods are needed to manage it. One such method used is a LIMS. A LIMS provides a way of automating part of the laboratory system. In a traditional laboratory 75% of the total cost comes from manpower. Removing the need for some human interaction can significantly reduce overheads. The primary function of most laboratories is to provide validated information under some sort of time

constraint and then based on that information, allow customers to make decisions.

Nowadays, traditional record keeping solutions are simply not up to the task. A LIMS can be of great importance in integrating laboratory operations with the laboratory itself. One of the most important aims of a LIMS is the integration of many different sub-processes, bringing together and consolidating the efforts of potentially many individuals and consequently speeding up the whole process. LIMSs can save considerable amounts of time and dramatically improve the level of data access for all stakeholders of any given project. This is where a LIMS can become extremely beneficial. The sooner the user is notified of a problem, the sooner that problem can be fixed and the less the solution will cost. The ideal

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LIMS should help provide the documentation to ensure that a laboratory and all of its operations exist in compliance. LIMSs have been used for over 20 years and the technology has been considerably evolved during this time. This paper will document the current state of the LIMS technology and attempt to identify some of the pitfalls of the current technology.

Laboratory Information System – Features

- Multi-site, multi-facility specimen tracking and lab support
- Accurate, up-to-the-minute patient data and charge information
- Automatic generation of collection lists, labels and worksheets
- Instant comparison and statistical analysis of test results
- On-line patient inquiries, reports, and summaries
- Integrated inventory management and maintenance scheduling for laboratory instruments
- Process screens that allow multiple functions to be accessed for multiple patients and specimens from one screen
- Lab Reagents & Kits Inventory Management
- Lab Register Maintenance
- Automatic indenting for the material required based on the consumption and Uploading of Patient Reports on the Web for on-line viewing and printing
- Equipments Interface for capturing of result

Background & Objectives

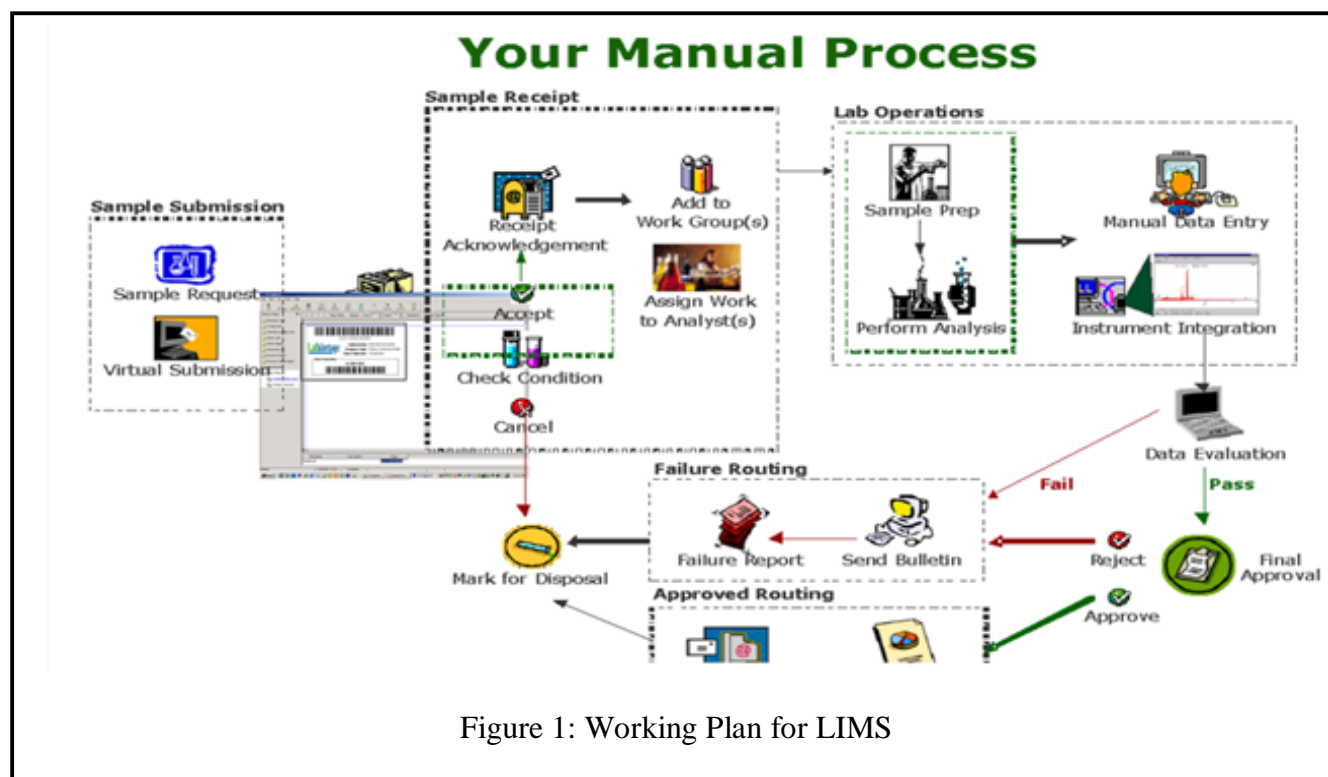
- The management and administration of data is often the key to competitive advantage.
- Information is a crucial capital asset of any business, none more so than within the modern laboratory environment.
- The commercial prospects of the operation are directly related to the successful

management of its information resource.

- LIMS are not just about running a more efficient laboratory: it is a mission-critical component of a successful commercial laboratory in quality control, process control and R&D environments.
- LIMS is the conduit for information from the minutiae of data from lab instrumentation, back to the controlled environment managed by the operator, and on into enterprise-wide process control systems.
- When used strategically within a corporate Information Management and IT structure, LIMS can provide the crucial link between the laboratory and the wider operations of the business

Need For LIMS

- LIMS provides solution to labs that fit within the overall corporate strategy, enabling flexibility and cost reduction and better service.
- LIMS enables the labs to Reach beyond the four walls of the lab by allowing to Share information with internal and external customers facilitating the Virtual Lab and provide business benefit in real-time.
- LIMS helps to improve management capabilities by rapid reporting at various levels of detail.
- Currently, in most labs, all of that information is in isolated pockets in the forms of lab notebooks, logs, manual reports, excel spreadsheets and so on. Therefore, if after a month of a sample result publication, the lab needs to track every step of the sample's path in the lab, it would be a tedious and often impossible task. This form of hardship in tracking sample information can lead to grave danger in terms of quality processes adhered by a lab. With the help of a LIMS, managing all this information becomes an easy and natural process as these applications are developed specifically having these criteria in view.



Case Studies

1. Dabur Pharma Limited

Dabur Pharma Limited is the leading Indian company for cancer research and anticancer products. The company also markets a range of products in the cardiovascular, antibacterial, antidiabetic & digestive segments. Dabur Pharma Limited, a public limited company incorporated in March 2003, is an associate company of Dabur India Limited, a US \$ 250 million healthcare company founded in 1884. Dabur Pharma Limited operates in Europe and in some other markets through its fully owned subsidiary - Dabur Oncology Plc. The Dabur group of companies has a legacy of trust and excellence in the healthcare business.

2. IPCA

Ipca is a fully integrated, rapidly growing Indian pharmaceutical company. Ipca's APIs and Formulations produced at world class manufacturing facilities are approved by leading drug regulatory authorities including the US-Food and Drug Administration (FDA), UK-Medicines and Healthcare

products Regulatory Agency (MHRA), Australia-Therapeutic Goods Administration (TGA) etc. IPCA has operations in over 100 countries. Forbes, a leading US business magazine, selected Ipca in 2003 among its top 200 successful, rising companies outside USA, with sales under USD 1 Billion. Ipca is one of the largest suppliers of these APIs like Atenolol, Chloroquine Phosphate, Furosemide etc. and their intermediates world over.

Market Dynamics in India

LIMS market is in a nascent stage.

- The market is estimated around US\$ 5 million with an expected growth rate of 15–20 % per year.
- Major Players: Labvantage Solutions, Star LIMS, Labware, Thermo Scientific, Perkin Elmer and Novatech.
- Indigenous LIMS providers such as Caliber Systems, Ocimum Biosystems and Oasis LIMS have 15-20% market share.

CONCLUSION

LIMS is centric to the activities of a wide range of companies to ensure that their product – be it a manufactured item or a piece of information-is produced effectively and to specifications. LIMS will help in reducing the time needed to get a product into market by providing the best information quickly and in an easy to assimilate form that is accurate and meets the regulator's and customer's demands.

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