CALCULATING COSTS

HOW A LIMS-BASED COST RECOVERY MODEL CAN IMPROVE OPERATIONAL EFFICIENCIES AND RESOURCE UTILIZATION

by Vishnupriya Bhakthavatsalam, Ph.D.

Laboratory Information Management Systems (LIMS) serve as the interface to a laboratory's data, instruments, analyses, and reports (Figure 1). For many analytical laboratories, a LIMS is an important investment that assists laboratory management in evaluating the efficiency of the laboratory's operations and reducing costs. In order to understand how low-level services relate to higher-level offerings, we may have to analyze usage patterns and establish metrics that drive costs in an analytical laboratory. We can use LIMS automation to calculate overall costs for base laboratory operations and create invoices on a per-sample basis as well as for batch sample shipments. Every laboratory has its own method of calculating costs for exporting into its accounting database. LIMS reports assist analytical labs not only with their expense budgets, but also with their capital budgets. The invoice created per sample usually includes a factor for overhead costs. These costs typically include depreciation value on the cost of the capital equipment. Payback time for a capital expenditure is obtained by dividing the cost by the annual cash flow (sum of income plus depreciation).

Hence, we need to develop a chargeback strategy for each service rendered and devise a model that pushes forward economical behavior, thus making it possible to charge clients fairly for analytical services. Healthy cost recovery methods in an analytical lab help measure adherence to procedures, as well as help meet time, quality, budget, and safety goals. They also assist in measuring the five facets of innovation, which include developing new methods, improving procedures, keeping up with technology, workplace organization and meeting unique customer needs. The mechanism for cost recovery should be practical and relatively simple to implement. Additional factors are how well it can capture laboratory operations and utilize the functionality offered by the LIMS to prepare monthly invoices for all the samples received. After implementing a chargeback methodology, analytical lab managers should include baseline reporting and key performance indicators (KPIs) in their practices: at fixed intervals, measure and report the savings realized, solicit feedback from upper management, and provide continuous review for ongoing process improvement.

As every analytical laboratory operates in a unique manner, it will be easier to configure a cost recovery module in the LIMS based on dividing the laboratory's working hours into convenient units based on the appropriate activities. LIMS can capture these

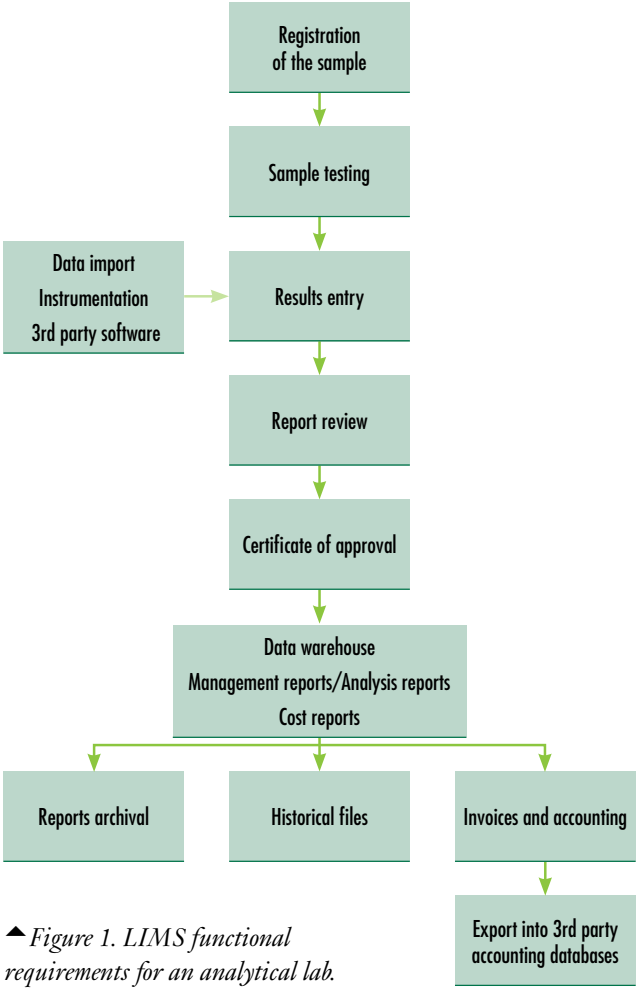

Figure 1. LIMS functional requirements for an analytical lab.

units of time by individual instruments and personnel. These time sheets are used by LIMS to compute charges against specific client activity. Usually, proposed routine test costs should be benchmarked against the commercial/academic analytical labs. In this manner, the pricing methodology will be structured to promote efficiency and sustainable competition and maximize consumer benefits. Laboratory charges for rush samples are two times the charge of normal samples. For nonroutine tests, costing gets trickier, as the work may range from simple to extensive analytical studies involving additional labor, meetings, report writing, literature searches, etc. This is where we need to provide a best estimate of how much time these tasks will cost and present the estimate to the client. To do that, we can simply add together the analysts' time at their hourly rates, overhead charges, consumables, instrument time in hours, interpretation time in hours, and travel expenses to give the project cost to the laboratory.

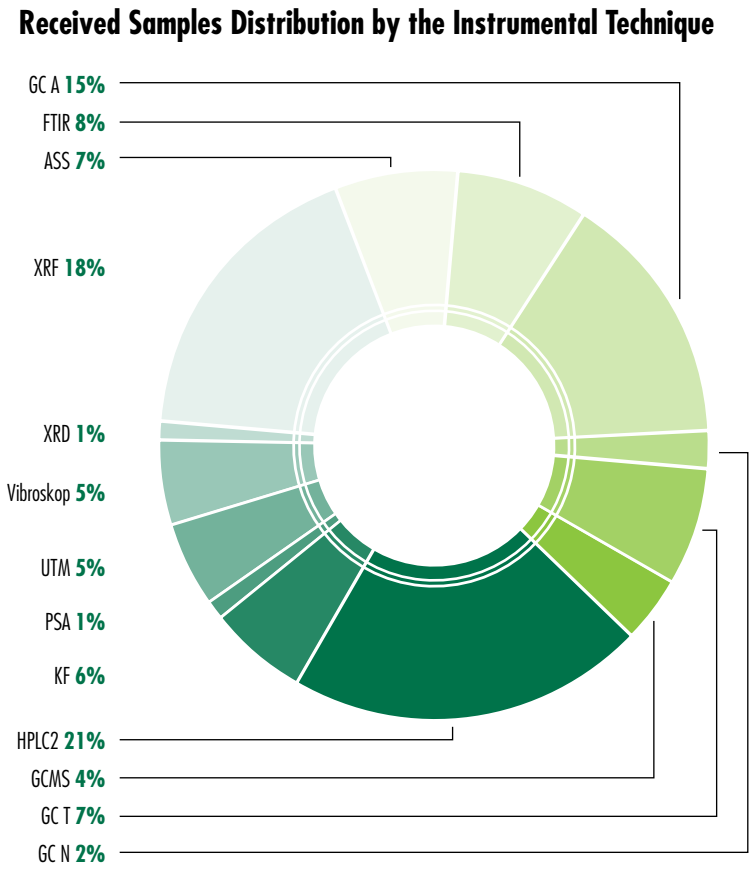

Figure 2. Workload situations in an analytical laboratory captured for a specific period.

Best practices demand that each job requested of an analytical laboratory be identified by a unique project code to which costs can be charged in an R&D environment. The project code names can depend on the clients and their projects, processes, products, etc. We can obtain invoice and account management reports by client project code, sample type, tests performed, number of samples, instrument used, test priorities, etc., in LIMS. Laboratory managers use these reports to study trends in productivity for different periods of time. Usually, after cross training, an analyst has three or four instruments as his first and subsequent responsibilities. Workload situations can vary at times for every instrument; hence, one cannot use the percentage samples received for every instrument alone to evaluate productivity for that period (Figure 2). It would also make sense to capture hard data for instrument utilization time in LIMS. This is because, on an average day, basic activities could account for 50 to 60 percent of the time, which is not limited to instrument time alone. For instance, in HPLC, sample preparation takes several hours inclusive of dilutions, flushing of columns, etc., for routine analysis; nonroutine analysis requires more time for changing of columns, etc. In the case of AAS, sample preparation, lamp setup and cool-down, instrument setting, and calibration require time for every sample. Meanwhile, dead time may involve housekeeping, inventory maintenance, safety meetings, and other laboratory quality measures such as ISO, Six Sigma, and gauge R&R. Separate non-project codes for laboratory's own use can be set up to capture the above activities.

Overall, a technician is 80 percent productive, but the higher-level staff typically have other duties throughout the day (interruptions from other staff to answer questions, customer meetings, monthly reports, yearly and mid-yearly appraisals, vendor meetings, negotiations, conferences and interviews, etc.,) that cannot be charged out. However, it is a challenge to capture above administrative activities in LIMS. LIMS also captures project-related activities, general analytical activities, and non-project-related activities such as installation,

training, and maintenance/repair of the instruments. By designing a cost recovery module in LIMS on the basis of the ground rules above, we can produce an effective cost summary through LIMS for any project on that specific instrument for a particular time. Cost reports will enable us to understand instrument load and, therefore, wear and tear on the instrument. The cost recovery for an analytical lab can be proposed by grouping instruments into two categories based on their utilization: 1) instruments utilizing ≥ 50 to 75 percent of capacity and 2) instruments utilizing ≤ 10 to 25 percent capacity, which are called "research instruments" in an R&D environment.

> "Robust cost recovery methods... help measure adherence to procedures, as well as help meet time, quality, budget, and safety goals."

Typical recovery targets, such as 50 percent of the annual depreciation value for 50 to 75 percent utilized instruments and 20 percent of annual depreciation value for < 25 percent utilized instruments within the first five years of instrument life should be comfortable for an analytical lab in a research environment.

The data on repair, downtime, and missed preventive maintenance collected from LIMS can be compiled into reports to reflect instrument performance and allow us to choose between buying replacements and outsourcing. Costs assigned to each piece of equipment can be compared to the actual data collected in the maintenance management system to identify outliers. The costing data from LIMS will be pooled once every quarter and calculation of the recovered cost for every instrument will be carried out. This will help us in setting new cost recovery targets. A report of deviations, if any, can be compiled and presented to top management. Further fine-tuning of the cost-recovery percentage targets can be planned.

LIMS reports on the performance of individual assets (preferably a group of instruments) would shed light on competencies needed for an analytical laboratory and also on resource utilization apart from ROI. An analytical laboratory can be self-sustaining only if it has a sound cost recovery model and proves itself to be a profitable business.

Dr. Vishnupriya Bhakthavatsalam *is the laboratory manager of the analytical science and technology (AS&T) department of Aditya Birla Science and Technology, Taloja, Mumbai. She can be reached by e-mail at vishnupriya.b@adityabirla.com or by phone at 091-22-2740-3164.*