LIMS Fits Labs
A Complex Problem Meets a Simple Solution

By Pat Ehrman

Improving and advancing its information management system was the primary goal for DonLevy Laboratories, a Merrillville, Ind.-based contract microbiology lab and consulting organization dedicated to the food industry.

That goal was the primary focus for laboratory manager Peg Exo, who supervises DonLevy's lab operations, including the production of sample labels, bench sheets, analytical reports and invoices.

To meet customer expectations, Exo found herself maintaining an increasingly vast collection of Microsoft Excel templates for each client. The complexity of the system began escalating, and producing a bench sheet required locating the appropriate template for a customer's specific product and entering the sample description and then transferring the sample description to the customer's preferred final report format and entering results.

Invoicing required generating the preferred template for each customer and typing the appropriate billing data. In short, the system required excessive, repetitive data entry to process each sample. DonLevy wanted to simplify its operations without disrupting business. DonLevy had invested considerable resources creating its spreadsheet-based data system. It was unwieldy, but Exo recognized its benefits.

DonLevy's commercial success proved that its customers appreciated their efforts. But the hours devoted to locating and copying formats, the repetitive data entry and its inherent risk of error, were increasing. The spreadsheet system was functioning as required, but it had reached critical mass and its disadvantages began to outweigh its advantages. It was time for a change for the better, and a laboratory information management system (LIMS) was the change they needed.

The Search for a Solution

Exo began her quest for a LIMS by discussing options with her colleagues and clients who had experience with lab automation. She searched the web, contacted LIMS providers, evaluated demos and experienced an on-site demo, eventually concluding that each system offered desirable features; however, no canned package met DonLevy's needs. Exo needed more control over her printed reports than was available in most off-the-shelf LIMS.

"For us, a LIMS system had to maintain the flexibility which allows us to be immediately responsive to client requests," she adds.

One of DonLevy's bigger customers referred her to Mountain States Consulting, LLC (MSC, Jackson, Wyoming) and she viewed their online LIMS product demo.

"MSC-LIMS was selected because it was highly recommended by current users, was within our budget, offered many of the features we were looking for and, most importantly, MSC would provide customizations to meet our most critical requirements," Exo says.
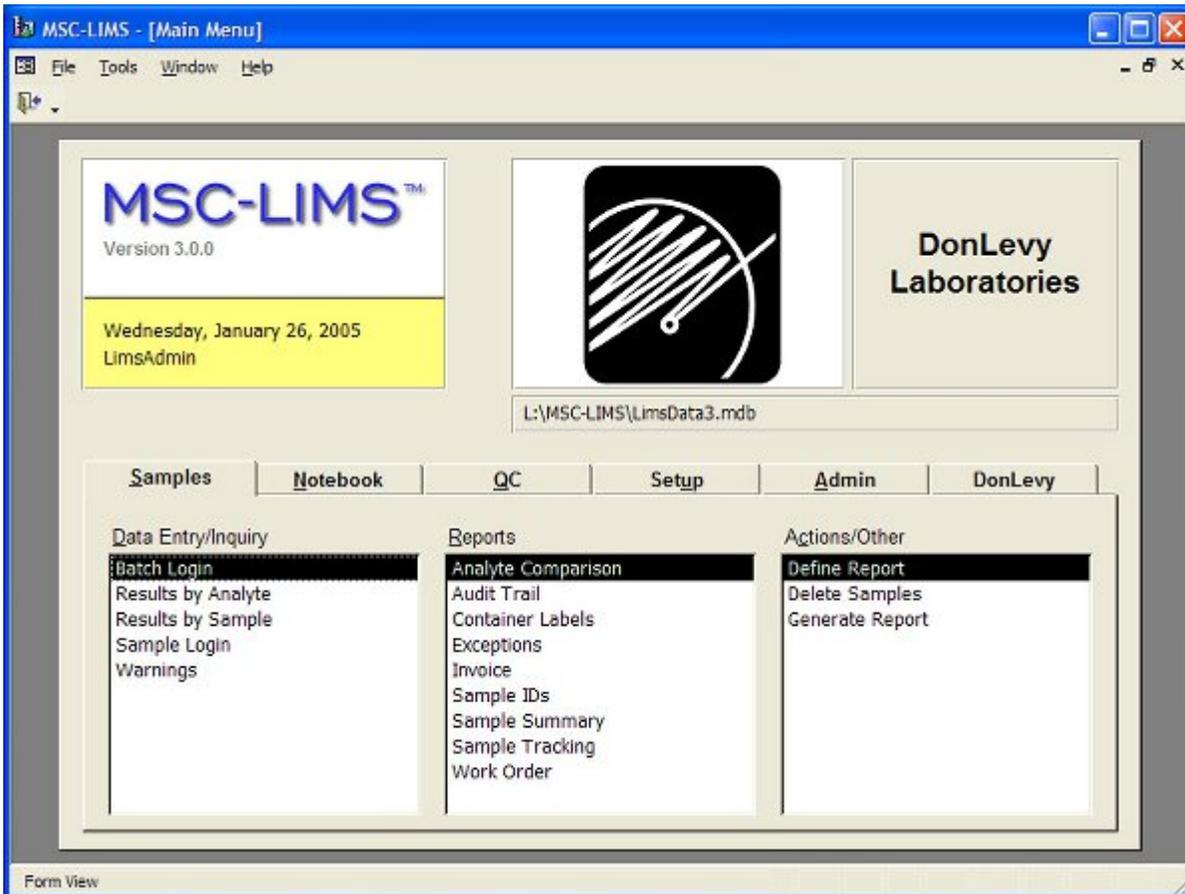

Figure 1, DonLevy Laboratories' MSC-LIMS Main Menu

Critical requirements included maintaining established labeling procedures and printed formats, recalls Rick Collard, founder of MSC. "DonLevy was understandably reluctant to adapt their procedures to the demands of an off-the-shelf LIMS. Our product eliminates that necessity."

Exo learned that MSC-LIMS is a particularly good replacement for homegrown Excel spreadsheets. It provides all of the traditional benefits of a LIMS, such as easily accessible, well organized and secure data, access to historical data, faster reporting and increased lab efficiency. Moreover, MSC-LIMS also provides extreme flexibility through its unique integrated Excel interface, which allows labs to leverage their existing spreadsheet reports.

"LIMS users enter data just once," Collard explains, "then they can query data to report in various formats. So we added formulas, macros and appropriate infrastructure to DonLevy's existing Excel spreadsheets, instructing Excel to produce the reports with LIMS data."

Functional Advantages

Collard described functional advantages in the way MSC-LIMS works, saying that the heart of the LIMS is an industry standard, relational database, which provides significant advantages over Excel-based systems.

First, he says, the database itself is the central repository for all LIMS data - already presenting a distinct advantage over gathering data either manually from paper files or electronically from multiple Excel files. Second, login accounts and multi-level security roles control access to the database and "audit trail events" record changes to sample data – security tasks that are not easily accomplished with Excel files. Third, the relational database includes its own rules that guarantee the logical integrity of the data.

For example, a "customer" record cannot be deleted if doing so would result in "orphaned" samples already entered into the system. And finally, a relational database allows a data item to be entered once but made available in any number of views using relationships. A good example is an analyte name that may appear in many samples using a relationship between sample data and analysis definitions. No matter how often the analyte name is referenced throughout, it physically appears only once in the database. Changes to the data item are simple and fast, and the updated information is immediately applied throughout the system.

Collard, Exo and her staff brainstormed DonLevy's customizations, and Collard designed and implemented the necessary software enhancements. Using customer setup procedures in MSC-LIMS, Exo was able to configure all of her clients' records, their contact information, analysis prices and multipliers. She defined LIMS projects with customer-specific products, analysis specifications and sample description templates. MSC-LIMS automatically assigns DonLevy's innovative sequential report numbers to a sample batch the moment it is logged.

Now, when DonLevy's technicians log a sample batch into the LIMS, they type minimal input for the sample description, and MSC-LIMS automatically produces customer-specific lab labels and Bench Sheets showing all customer-specific sample information, lab number, report number, sample description, and the required analytes with their appropriate media and dilution.

Results entry is equally simple: Technicians query the customer report number printed on the Bench Sheet and type analysis results into data-entry fields on-screen. Results validation is automatic.

Final reports are generated when technicians use a pick-list to select the customer's preferred report template, and MSC-LIMS' Excel interface generates the report to specifications. The reports can be e-mailed in PDF format or printed for mailing or faxing.

Invoicing follows the same procedure, where a query reveals all samples completed during the specified billing cycle. MSC-LIMS' Excel interface generates each customer's invoice on the preferred letterhead template.

DonLevy's remaining requirements, including QC features, multiple users, compatibility with existing Windows-based PCs, and ability to handle its current and future sample processing volume, were also met by MSC-LIMS. Collard considers a system that satisfies 80 percent of a lab's requirements "out of the box" a good fit. The remaining 20 percent of a lab's requirements can be met through customization.

What's the difference between configure and customize? "Configurable elements are built-in options such as user-specified analyses and sample types," Collard says. "Customizations require software modification which can be extremely flexible, such as incorporating existing sample identification systems or adapting to accommodate unique business processes." In Collard's experience a one-size-fits-all product becomes enormously complex and therefore expensive. Customizations serve to keep costs down.

The system was installed at DonLevy "with minimal disruption to our daily routine," Exo says of on-site installation and training.

"We ran our Excel system and the LIMS concurrently for a month. When we went live we were prepared and confident in our ability to utilize the LIMS," she adds. Exo believes MSC's commitment to timely customer service is a philosophy they share, and she appreciates not spending her valuable time on "hold" when she phones for support.

"Each time I contact MSC my goals and objectives are taken seriously. I believe [Collard] understands the dynamic nature of an independent laboratory and is willing to help me fulfill the expectations of my clients," Exo says.

Collard adds that a fit between software and users is critical.

"MSC-LIMS was a good fit with DonLevy Laboratories initially, and with some customization they now have a system that meets their needs," he says. "A lab should not have to revise its operations to utilize a system; the system should adapt to their rules."

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