

# Evolution of Technology: Moving Away from the Paper Trail

## THE COUNTY OF SACRAMENTO DISTRICT ATTORNEY'S LABORATORY OF FORENSIC SERVICES AUTOMATES THE CHAIN OF CUSTODY PROCEDURES

SIMON KEY

When he joined the lab 22 years ago, Supervising Criminalist Eric Parsons could not have imagined that the Sacramento County District Attorney's Laboratory of Forensic Services would today be serving a population of over one million people and handling over 15,000 cases annually. Nor could he have foreseen the changes brought on by technological advances in forensic science.

In 1983, the lab's manual, paper-based evidence tracking procedures were enough to properly protect the chain of custody. But, ten years later, facing much heavier case loads, the lab developed its own in-house laboratory information management software (LIMS) for automating the receiving and tracking of evidence.

According to Parsons, the potential exposure to efficiency problems with the chain of custody was central to moving to an automated system. "We were fortunate that one of our criminalists, Ben Smith, was a highly-skilled software developer," says Parsons. "Because Ben knew from experience how a crime lab operates, he developed a LIMS program that met our exact needs – and that served us well for the next nine years."

### Processing Evidence in the Digital Age – The Pressure to Automate

Over the past decade the Sacramento District Attorney's crime lab's caseload has grown significantly. Parsons notes that cases have also grown more complex, requiring more evidence to go to trial. "There are many theories as to why this is happening," he adds, "One theory is that juries have become much more aware of the types of evidence that could be made available to them to help in their decision-making process. Televised trials and forensic-related TV dramas have contributed to this awareness. Cases can now involve hundreds of pieces of evidence. DNA evidence, considered rare ten years ago, is now routine."

Coupled with the heavier case load are added time pressures. Certain types of evidence require quick turnaround, such as for drug, toxicology, and DUI cases. "In some instances, if the

results are not produced soon enough, the suspect must be released on his or her own recognizance," says Parsons. "Other cases, particularly those involving illegal drugs, may be adjudicated early and need quick lab results." Beyond requirements and regulations, the human factor must also be considered in processing evidence. "As cold as the science may seem, we know that we're often dealing with emotional situations," he adds. "Someone is waiting for answers."

In the face of these changes, the lab's in-house LIMS was struggling to keep up. Smith, the original developer, had left the organization. "The software's features were hard-coded, so every time we wanted to add a new service or reconfigure something, we had to go in and change the source code," says Parsons. "While I maintained contact with Ben for assistance, I knew we needed a new solution and support system."

### The RFP Process

In 2002, Parsons prepared to choose a new LIMS system. His first step wound up being the most critical – he assembled a cross-discipline team, including scientists and technicians from all areas of the lab, as well as administrative staff. "We needed everyone in the lab to feel a sense of ownership over the process in order for the new system to be accepted," he says.

The next step was for the team to examine the lab's operations in micro- and macro-detail, including how evidence flows through the system and how scientists and technicians enter notes and generate reports. By re-examining the way evidence flows through the crime lab, the team could find areas that would benefit from a new LIMS system.

"It's always beneficial to step back and look at the entire lab's operations," adds Parsons, "In addition to exposing areas in need of improvement, you also have the opportunity to plan for the future." As an ASCLD-accredited lab, Parsons and the team also wanted to be sure that the new LIMS system supported this accreditation.

After mapping out the lab's processes, the team developed

## How Evidence Flows through the Crime Lab

Evidence is collected at the scene and logged into police department system

Evidence is submitted to crime lab's centralized evidence receiving area where it is logged into the LIMS

Electronic chain is established, protected by a barcode and secret PIN

Evidence transferred to one or more analysts for analysis and results entry

Results are then approved via technical and administrative reviews and a final report is published

Old LIMS

Analyst calls, faxes, emails, or hand carries results to select parties or those parties call crime lab for results

New LIMS

Results posted on webpage. Involved parties are automatically emailed when reports are completed.

Physical evidence is transferred to the lab's property and evidence section

Physical evidence is returned to the submitting agency

the criteria for the RFP. The most critical criteria included:

**DATA INTEGRITY** – First and foremost, the chain of custody must be protected. How far does the LIMS go to eliminate the sources of human error? Parsons emphasizes, “There’s an old saying in forensic science that goes ‘Interfaces alter cases.’ We were looking to our LIMS to eliminate the need for excessive human interface, to improve data accuracy, and free up our scientists and technicians to concentrate on the science.”

**FLEXIBILITY AND CUSTOMIZATION** – A limitation of the lab’s old LIMS, easy customization, would enable the staff to add services and assays as needed; and would allow for future growth and expansion. Parsons and the team wanted the flexibility of easily adding test equipment to the LIMS at a future date.

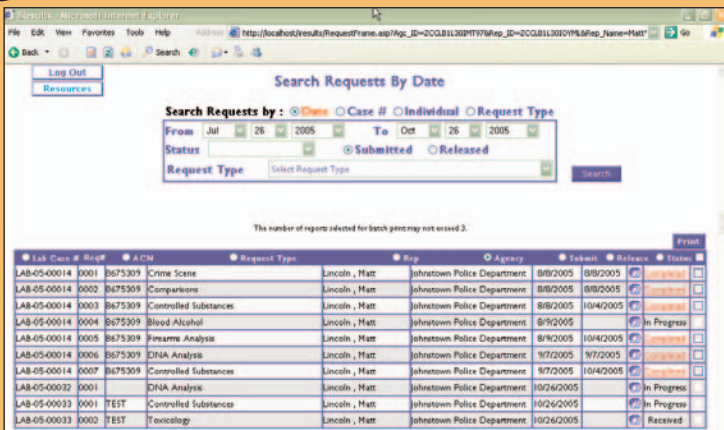
**COLLABORATION AND REPORTING** – Can the data be easily shared among scientists, prosecuting attorneys, and others involved in the case? Can this collaboration be automatically documented? How easy is it to share the results, and are the reports useful and easy to understand?

**SECURITY** – Bullet-proof security was an obvious necessity for protecting the chain of custody. At any given point during the process, the lab must be able to account for the evidence in question, answering questions about who handled the evidence and when. The lab needed the LIMS to allow policies to be set to permit certain staff members access to certain data, while recording the details of who was handling the evidence. In addition, the LIMS had to offer multiple layers of data protection.

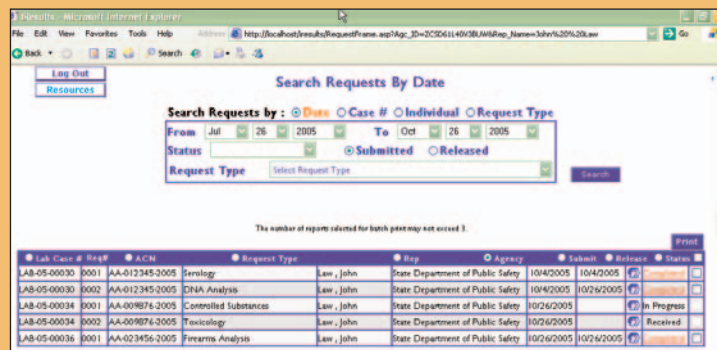
**MAINTENANCE AND SUPPORT AGREEMENTS** – Parsons and the team wanted to ensure that its new LIMS would be backed by a company with a long track record and proven customer relationships. They needed the software to evolve with the lab, rather than becoming static and eventually obsolete. In addition, the team did not want unexpected budget hits from software upgrades and repairs.

### The Decision

After firming-up the criteria, Parsons and the cross-disciplinary team sent out the RFP for bids. Of many responses, the team narrowed the list to five candidates and met with each to test their solutions. After much evaluation, Parsons and the team decided on

**B**

SACRAMENTO COUNTY'S NEW LIMS SYSTEM DOCUMENTS EVIDENCE TRANSFERS, NOTING DATE, TIME, AND LOCATION.

**C**

PROSECUTING ATTORNEYS AND OTHER CONCERNED PARTIES HAVE SECURE ACCESS TO LAB RESULTS.

LIMS-Plus from Arizona-based JusticeTrax. Key factors in the decision were the solution's integration of evidence handling with comprehensive reporting, its customization capabilities, and its ability to work well with other products, such as barcode printers, scanners, and signature pads.

"We felt that the JusticeTrax team, many of whom are former crime-lab professionals themselves, really understood how our lab works," says Parsons. "They were able to provide a customizable solution that accounts for our particular organization and enables us to set our own preferences. The end result is that we can better serve our clients."

### Migration and Implementation

Transferring the data from the old LIMS to the new system was a delicate process. Whereas in some environments, IT staff can create a mirrored system that runs old and new systems in parallel, this technique did not make sense for the Sacramento County lab, largely because it would have required double-logging of all data.

"The stakes were too high and our caseload too heavy for us to experience errors and downtime during the migration process," says Parsons. "We worked closely with the vendor to create a test system, and took many steps in the migration, examining the accuracy of the data frequently."

After a successful migration, the lab began its implementation of the new LIMS system. The first step was con-

ducting internal calculations to ensure that the tests, such as blood alcohol or enzymatic amino assays, were producing accurate results. Running such tests ensured the LIMS was functioning the way it should.

Next came integration of lab equipment, which includes instruments from Hewlett-Packard and PerkinElmer. To address the instruments' non-standard interfaces, A macro was written to enable the equipment to communicate with each other on the LIMS.

### The Results

The Sacramento County lab's LIMS system has now been in place for three years, and has been put through its paces. One of the key benefits of the new LIMS is improved communication and collaboration among the lab, outside attorneys, and other parties involved in an investigation.

Parsons used to spend much of his day on the phone with investigators or prosecuting attorneys discussing the status and results of tests. As part of the LIMS, JusticeTrax created a web page on Sacramento County's private intranet. Parties involved in a case can check the site for results.

"As an example, the DMV requires DUI test results in a timely manner," explains Parsons. "We used to have to fax results to them, often multiple times, to ensure receipt. Now the DMV is assured test results faster and

more efficiently. We've received a lot of positive feedback from the attorneys and law enforcement departments on the convenience of the web page."

### **The Future**

Parsons expects the lab to expand its integration and automation capabilities, including integrating more of the lab's testing and assays into the LIMS and creating a completely online digital system for images. "We're also going to explore the possibility of integrating the police department's initial evidence logging with our LIMS," Parsons says. "This integration will not only save time, but increase log-in accuracy."

### **Final Advice to Crime Lab Directors**

When asked what advice he'd offer crime labs considering a LIMS, Parsons stresses the need for the initial planning. "Building a representative team of decision-makers ensures buy-in to the new system. Also critical is the team exercise of stepping back and looking at how evidence flows through the lab. Better understanding of your lab's functions and processes leads to better decisions when choosing a LIMS vendor that is right for your environment."

*Simon Key is the President of JusticeTrax, Inc. He can be reached at 1-800-288-LIMS or keys@justicetrax.com.*

*JusticeTrax is a leading provider of electronic case management software for forensic laboratories and Medical Examiners/Coroners offices. With both our LIMS-plus and PathAssist software applications Criminal Justice Professionals will receive a case management system that speeds delivery of services, standardizes best practice, reduces costs and greatly assist in overall workflow.*

