



Analyst examines a microscope slide for the presence of sperm.  
IMAGE COURTESY OF THE KANSAS CITY, MO, POLICE DEPARTMENT  
FORENSIC LABORATORY.

# AUTOMATING DNA sample testing

Fine-tuning DNA sample testing with automation can improve efficiency, boost productivity, and reduce backlogs in busy forensic laboratories.

BY ROBERT GALVIN, AN OREGON-BASED WRITER WHO WRITES ON EVIDENCE TECHNOLOGY TOPICS. HE CAN BE REACHED AT [RSGPR@MSN.COM](mailto:RSGPR@MSN.COM).

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Automation is playing an increasingly important role in today's demanding laboratory environment. And in forensic laboratories, automation is particularly crucial for the DNA units which are struggling to reduce sample backlogs and eliminate human errors that can hinder criminal convictions. Effectively completing cases means there must be efficient work flow and laboratory operations so processing time, backlogs, sample tracking, throughput and reports can be improved. Automation can streamline all of these operations.

Most laboratories today are automated to some degree. For many forensic labs, a specialized Laboratory Information Management System (LIMS) handles the general requirements of laboratory evidence

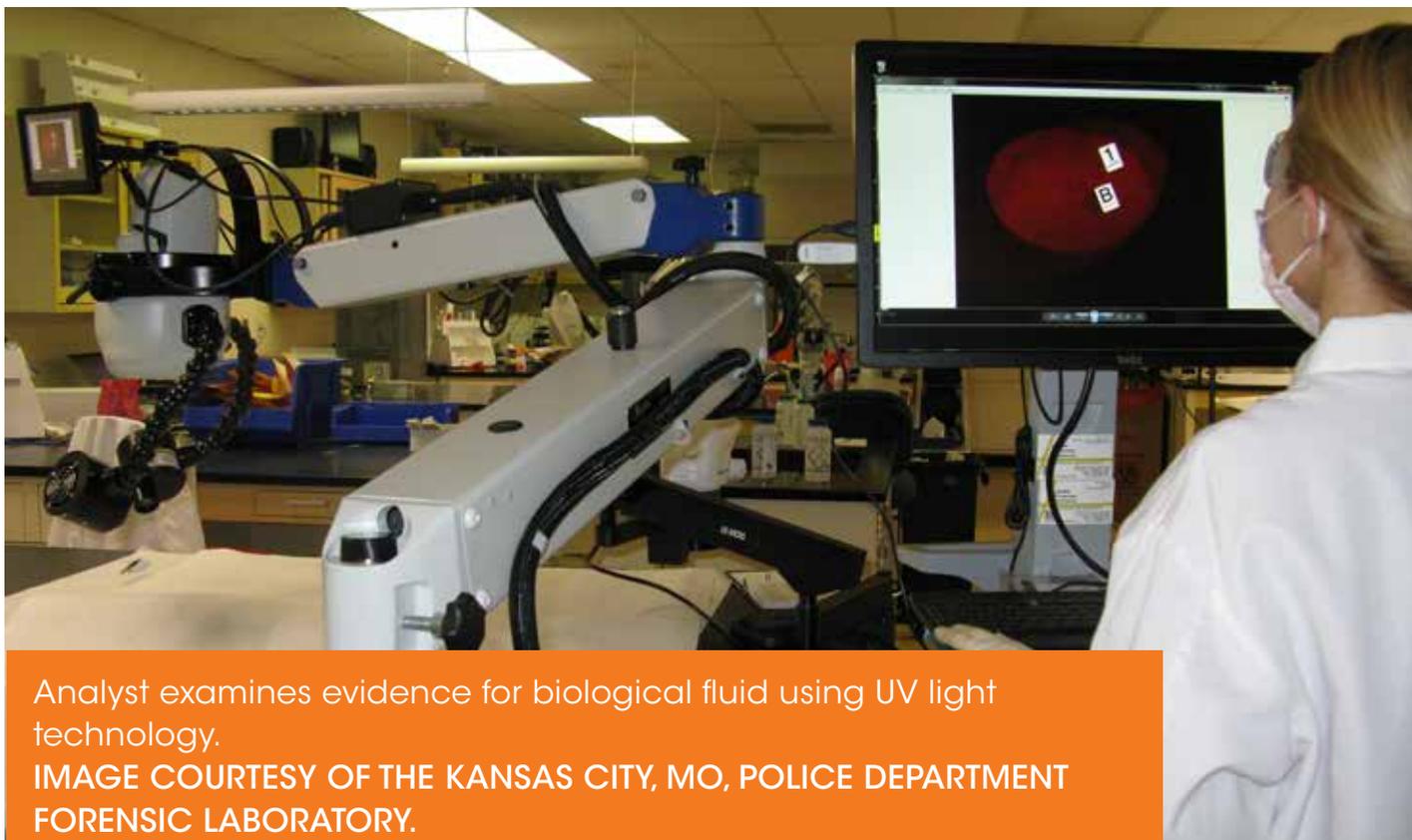


Screenshots from the LIMS-Plus System.  
IMAGES COURTESY OF JUSTICETRAX.

Reagents			
Name	Lot #	Expiry	Qty
Quantifier D	Duo0310	03/10/2015	578.0000
Protienase K	PK03101	03/10/2015	500.0000
PowerPlex 1	PP03101	03/10/2015	976.0000
LIZ Internal	LIZ0310	03/10/2015	1000.0000
Identifiler Pl	ID03101	03/10/2015	500.0000
Formamide	FORM03	03/10/2015	300.0000

My Tasks			
New	Process	Assigned	Reviews
+	Extraction	6	0
+	Quantitation	2	0
+	Amplification	1	0
+	Detection	8	0
+	Refinement	0	0

The screenshot shows the LIMS-Plus DNA system interface. The top navigation bar includes 'Dashboard', 'Supervisor Dashboard', 'System Administration', 'Linkup', and 'Sample Management'. The main content area is titled 'System Administration' and contains a grid of buttons for various functions: Staff, Security Roles, Profiles, DUO Generator, Email Notifications, Transferable Labels, Session Configuration, EOPs, Labs, Groups, Amplification Kits, and Report Template.



Analyst examines evidence for biological fluid using UV light technology.

IMAGE COURTESY OF THE KANSAS CITY, MO, POLICE DEPARTMENT FORENSIC LABORATORY.

processing. The LIMS can solidify the chain of custody of evidence, eliminate transcription errors, shorten the data path between instruments generating analytical results, streamline data evaluation by scientists, and facilitate the reporting of results, which are so crucial to a forensic laboratory's operation. Also, it is important that a LIMS provide a central repository of analytical data to help scientists perform historical trends analysis.

The LIMS-Plus software from Mesa, Arizona-based JusticeTrax addresses these needs. Its features include tracking of requests for analysis; laboratory configured analytical modules; evidence barcoding; professional communications via tailored report templates defined by each laboratory; quality management via uniformity of information (recording use of test methods, training records, instrument validation, and other facets); and improved doc-

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umentation of physical evidence.

Automation through a LIMS is equally necessary for DNA sample testing. Robotics used for DNA testing perform many needed steps. However, a more defined solution, which can integrate with a LIMS, can overcome challenges including:

- problematic error checking;
- an inability to track samples;
- cumbersome documentation;
- an inability to prevent, track, and correct transcription errors;
- the managing of multiple data entries; and
- the complicated peer review process.

In 2014, JusticeTrax introduced a standalone solution called LIMS-Plus DNA. This software is designed to reduce DNA backlogs by automating forensic sample data processing for case work and databanks as well as automating the delivery of DNA profiles to local, state/provincial, and national databanks. After a forensic laboratory installs a LIMS and its scientists and analysts become comfortable with its use, acquiring a standalone DNA automated solution is a natural next step.

Jay Henry, lab director with the Utah Department of Public Safety, and immediate past president of the American Society of Crime Lab Directors (ASCLD), agrees that automating DNA sample testing is a necessity.

“We’re seeing a big change across the whole scope of forensic science,” he said. “Laboratories are upgrading DNA automation, and already, robotics put in place have increased the sample testing capacity tremendously.”

Henry said automation can be particularly useful for this kind of test-





ing so samples can move seamlessly from instrument to instrument, hands-free.

“This way, analysts can sit at a computer and analyze all of the genetic data that’s coming off the instruments,” he added. “And an automated software program handling this can also analyze the data.”

DNA analysis requires more steps that laboratory personnel need to watch and track. With more rules and requirements to follow, a separate DNA sample management solution is a growing priority among forensic laboratories.

“A separate system is the only way we’re going to electronically meet our DNA documentation needs,” said Jenna Oakes-Smith, LIMS administrator at the St. Louis, MO, Metropolitan Police Department. The St. Louis PD’s forensic laboratory has been using the JusticeTrax LIMS-Plus program for several years, and this spring it expects to go online with the company’s LIMS-Plus DNA product.

“This software seems to address workflow well,” Oakes-Smith added. “Each stage of the [DNA sample] analysis has a place for all the necessary information. Yet it has flexibility so that we could still have and perform our own procedures.”

The ability to add information and notes as the software proceeds through testing steps is another advantage. Such an open platform enables St. Louis PD’s laboratory to create its own reports and collect statistical data. The LIMS-Plus DNA software assures sample integrity by tracking each sample throughout the entire testing process. The software allows users to add electronic signatures to verify and witness certain critical steps defined by each

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laboratory during the sample processing.

Oakes-Smith considers user interaction while deploying LIMS-Plus DNA to be paramount, noting that she feels the software is intuitive with fill-in-the-box and drag-and-drop prompts. "How easy it is for the analyst to see the value of the software is important to us," she said. "We will look at turn-around time to see if the software helps us get reports out faster and the number of reports released to determine the impact on our production."

The LIMS-Plus DNA software enables transfer of DNA sample data to any LIMS and vice versa. This was one of the aims in mind as the software was being developed. According to Simon Key, president of JusticeTrax, the goal of any DNA sample management solution should be all about samples.

"We came up with a simple [software] design to both build the work list, what happens to a particular sample, and provide a lot of flexibility," he said. "We've also given the ability to configure methods so that for each of the steps in the DNA sample testing process you can really control what sort of plate layout is going to come up, what reagents are used in a particular method, who can perform these methods, and what sort of review steps are going to be required."

Oakes-Smith feels confident the new automated DNA solution her laboratory will deploy will provide efficiencies not previously attained. She anticipates it will boost sample processing, as well as kick out reports faster. In addition, she said, "It will increase our documentation and administration efficiency, which we hope will impact the [DNA] backlog." *LPN*

