



A68 Turn a Box of Case Files Into One Click on Your Screen Using a Specialized Laboratory Information Management System (LIMS) to Improve the Efficiency and Quality of Serology in a Forensic DNA Laboratory

Tian Liang, BS, Stephanie Masters, BS, Kari Killian, BA, Daniel Hellwig, MSFS, and Martyna Shallenberg, BS, Sorenson Genomics, 2495 Southwest Temple Street, Salt Lake City, UT 84115*

After attending this presentation, attendees will be shown how a specialized form of LIMS system can significantly reduce the process time and human errors of serology in a DNA laboratory. They also will learn the principles of how to design a more efficient LIMS system for different types of crime laboratories.

This presentation will give the forensic science community a different aspect of how to manage and track laboratory information in a superior way. It will compare the specialized form of LIMS to the traditional paper trials.

DNA analysis has become one of the most important criminal investigation tools. Serology, the first step of the DNA process, cannot be automated as other parts of this procedure due to the variation and complexity of the work and consequently more human errors could occur. *Sorenson Forensics, LLC* has improved both efficiency and quality of serology by utilizing a LIMS system with a software program, UNIFlow, developed by *UNIConnect*. UNIFlow is a software program that consists of different modules which are easily programmed by end users. After modification, it electronically tracks and manages every step of evidence and DNA sample handling, including case log-in, serology, DNA extraction, DNA analysis, and report generation.

This specialized LIMS system has significantly reduced the time of serology, averaging 20 minutes per case, by eliminating unnecessary work including filling out six handwritten forms (e.g., case evidence list, stain cutting list, reagent log, serology notes, case notes, and case management database). Uniflow also accesses four software programs (word processing, spreadsheet, database, and portable document software) to automatically input the same information repeatedly. Every detail of a case such as chain of custody (COC), case notes, serology notes and results, are entered real-time in LIMS. Hence, the COC can be recorded more precisely which protects the integrity of the evidence. In addition, backdating case notes is impossible which provides a truer representation of the evidence and DNA samples. All information can be corrected or changed if a mistake ever occurs; the changes are also tracked by LIMS and displayed on the final report. Moreover, by tracking information electronically, it largely prevents human errors such as misspellings, errors due to poor handwriting, and mislabeling tubes. By eliminating such human errors, LIMS largely reduces the possibility of sample handling errors. After serology is finished on each piece of evidence, the portion sent for DNA analysis is stored in an extraction tube with a unique barcode. The barcode is linked with all the information of the evidence and tracked in LIMS through every step of the DNA process. Therefore, sample swapping is almost impossible.

One of the most significant advantages of UNIFlow LIMS system is that it is highly flexible and can be programmed to meet the specific needs and preferences of various types of forensic and non-forensic laboratories. *Sorenson Forensics, LLC* had researched many different LIMS systems available on the market (e.g., *Beast* and *Justice Trax*) before establishing UNIFlow. There was no other forensic LIMS software that could be tailored to coordinate the laboratory work flow in extensive detail. Therefore, the company utilized UNIFlow software and literally built a specialized LIMS system from the ground up. However, certain laboratory personnel needed to be trained to program UNIFlow software, which may increase the initial input time and cost of this LIMS system.

Overall, by implementing the specialized LIMS system in a forensic DNA laboratory both the efficiency and quality of serology and the DNA process have significantly improved and human errors have been reduced practically or totally eliminated. This system is easily adjusted to various types of forensic laboratories which can enjoy the same benefits.

LIMS, Efficiency, Serology