

# DNA Crime Lab Increases Output by 30% with STACS DNA

*Multi-site lab increases productivity after one year,  
even with 25% staff shortage*

## **CASE STUDY:**

### **Missouri State Highway Patrol (MSHP)**

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#### **Lab Profile:**

- Three DNA Casework labs in Jefferson City, Springfield and Cape Girardeau
- 13 criminalists
- 5,000 DNA samples processed per year
- Previous system: LOTUS Notes LIMS

#### **Challenges:**

- Inability to track DNA samples
- Cumbersome documentation process
- Unable to prevent, track and mitigate errors
- Increasing property case backlog

#### **Solution: STACS-CW™ Enterprise**

- 30% increase in throughput, despite 46% staff turnover
- 57% reduction in peer review time
- Improved documentation quality, detail and standardization
- Reduced risks from capturing and documenting corrective actions
- Better adherence to procedures
- Reduced travel to access remote lab reports
- Smoother audits due to easy access to data
- Eliminated log books

CASE SUMMARY

## Missouri State Highway Patrol (MSHP)

**T**he criminalist was processing evidence. She made 20 cuttings from a shirt—each one a sample to be processed. As was the required procedure in her DNA lab, she opened 20 worksheets, one for each cutting, and entered the exact same information into each. This tedious and error-prone process would be followed hundreds of times a month.

Because of the way their systems worked, every sample had its own worksheet. For 20 samples, she had to fill out 20 different worksheets, including sample information and comments. Each sheet might take ten minutes. 20 sheets could take hours.

This was the way it was at the Missouri State Highway Patrol DNA laboratory in Jefferson City. The trouble was that the laboratory information management system (LIMS) was designed to track pieces of evidence (the shirt) and not samples (the cuttings). DNA lab staff would have to enter data into each worksheet at every processing step—extraction, quantitation, normalization, amplification, analysis—for 96 samples on a plate.

To make matters worse, new ISO guidelines came into play, making all the criminalists go into overdrive on documentation, bypassing the checkboxes and radio buttons built into the system and instead using the comments section to document in detail what they were doing for each sample. More time was spent documenting than actual sample processing. Productivity came to a grinding halt.

The Laboratory Manager and DNA Technical Leader for MSHP recognized that there had to be a better way. He is responsible for 13 criminalists in three DNA labs—Jefferson City, Springfield and Cape Girardeau. These labs were using a combination of paper, Excel and the LIMS built in LOTUS Notes that MSHP had developed internally and implemented in 2006 to manage cases across their forensic disciplines—DNA, drug chemistry, fingerprinting, firearms, and toxicology.

He arranged a process mapping analysis in 2008 to determine how his team could improve their workflow and operations. Specific goals were to find a better and easier way to track and batch samples, stop repeat verification of curve/controls and move away from paper log forms. This was reinforced by an audit in 2009 which flagged two concerns. One was that the lab was required to retain records of original observations and derived data. The second was that multiple lots of critical reagents could be used at the same time without the ability to determine which lot was used on a particular case.

The Lab Manager knew that a new LIMS would make a difference, but he wanted to avoid the situation he had seen at other DNA labs that had selected a lab-wide LIMS. They were forced to unplug all of the non-DNA modules, which eliminated the lab's interoperability with other systems. This undermined their ability to manage cases.

Given the unique and highly specialized requirements of DNA laboratories, the Lab Manager wanted a DNA-specific sample processing system integrated with the lab's instrumentation. His team chose STACS-CW™ Enterprise and has not looked back.



## Improved documentation and quality controls

MSHP implemented STACS-CW Enterprise in January 2012. Since then, the quality and detail of documentation has increased immensely; this also ties in directly with quality control.

Now batches, samples, instruments and all consumables are barcoded and tracked in STACS-CW. This decreases the concern that a sample has been mislabeled, or worse, that two samples have been switched. On the QC front, it also tracks and prevents the use of expired reagents or instruments under maintenance, which is critical to preventing significant quality control errors. From an inventory perspective, they never run out of reagents, gloves, or other consumables.

With the LOTUS Notes system, criminalists had to write the same information in multiple worksheets; STACS-CW does this all automatically. Documentation is more uniform, eliminating time required to decipher other people's notes and worrying about typos.

Previously, the numerous Excel sheets used to document batches generated .txt import files for instruments. According to the criminalist, it was inevitable that someone would mess up the Excel sheet and staff would spend a long time trying to fix it or get it to generate the import file they needed. Also, they would see a lot of mistyped case identifiers that would go all the way through the process and then have to be fixed or rerun. STACS-CW does all of this and it does it seamlessly.

The lab now uses STACS-CW for all QC records, including all calibrations, annual maintenance and performance checks for their pipettes, genetic analyzers, robot instruments, and thermal cyclers. This process is much easier to document, and it is easier for staff and auditors to access the records.

The Lab Manager reported that the improved documentation was one of the most valuable things that STACS-CW provided to his lab.

## It's like having an additional employee

In the last two years, the DNA lab has seen a 46% staff turnover. Six people have been hired and are now in training to replace others who have moved or gone on maternity leave, maintaining a headcount of 13 criminalists. However, more experienced staff must be taken off casework to train the new hires, so that each person is only achieving 30-50% of their usual output.

Despite this, the lab is processing 30% more cases through STACS-CW today than before it went online in January 2012.

According to the Lab Manager, the team is now able to do more with less. They have fewer criminalists working the cases, but they are able to put more samples through. That is directly attributable to STACS-CW.

He observed that, with this constant fluctuation in staff, STACS-CW is able to take on so much of their day-to-day business—QA/QC, ordering, tracking—that it's like having another body, which he finds extremely useful. He said he can't imagine where they would be if they didn't have STACS-CW during this period of transition.

The need to get a reliable system in place was even more urgent as the number of cases grew. Their turnaround times for high priority cases, which are person crimes (such as homicides and sexual assaults) have been maintained. But there has been a real increase in property crime samples as investigating officers are now able to get DNA from burglaries, robberies and car thefts.

## Smoother peer reviews make for a better working environment

Lab staff used to review a whole case from cradle to grave. They would have to verify all the hand-typed information in each worksheet. In general, they would spend one week working on a case, and two weeks doing the technical review. Friction resulted if a peer reviewer was determined to find errors or took sides.

Since using STACS-CW, the lab has reduced peer review time by 57%. STACS-CW breaks up the process so that a reviewer only needs to review a small portion of the case at a time. Now reviewers only need to ensure the comments are correct and that they can follow the sample's path through the process.

The technical review process has become a breeze, according to the criminalist. They no longer have to save all their quant files because the information is recorded in STACS-CW. They don't review all the controls dozens of times because it is documented. If there is a problem or error, a quick, simple comment in STACS-CW applies to all the affected cases and they don't have to document it in each one.

### Easier audits and access to information

Audits are a fact of life in a crime lab and four or five times a year the MSHP DNA lab goes through some sort of audit in addition to regular spot checks.

Previously, all quality control documents were done by hand and kept in files. Spreadsheets were printed and stored in a three-hole punch log book. To retrieve a document, a manager had to flip through the binder and find it, a cumbersome chore. At times, a criminalist would process samples but forget to fill out the formal paperwork, so there was no paper trail.

With STACS-CW, it is as simple as clicking on the report for an instrument. The dates are entered and all the correct reports are attached. There are no binders to flip through.

- HIGHLIGHTS
- *It's like having another body, which is extremely useful.*
  - *MSHP has cut audit time in half with the use of STACS-CW.*
  - *The technical review process has become a breeze.*
  - *MSHP caught a lot of corrective actions using STACS-CW that might not have been caught otherwise.*
  - *The Lab Manager sees better quality, less risk, and more procedures and processes being followed accurately.*
  - *Improved documentation was one of the most valuable things that STACS-CW provided to the lab.*

MSHP has actually achieved the paperless lab.

Through STACS-CW, the Lab Manager or an auditor now has easy access to the data and reports for all three labs from his office. As a Technical Leader, he is far more effective when he can easily make sure something's been done rather than having to travel to another lab to go through filing cabinets.

He claims that MSHP has cut audit time in half with the use of STACS-CW. They had an external audit recently



and were able to sit the auditor down in front of STACS-CW and say “everything you need is right here.” They were able to go right to maintenance reports and analysts and reagents reports right in front of him.

### **STACS-CW is critical to managing risk**

Criminalists are human beings, so mistakes are bound to happen. But forensic analysis is all about certainty. If errors are not properly documented, then all work from a lab is put into question, creating a very serious credibility, legal, management and operational situation.

According to the Lab Manager, it’s not about eliminating the risks; it’s about mitigating the risks. STACS-CW is also a risk management tool, where risk is mitigated by having everything done through the same system and all quality people, supervisors and managers have a bird’s eye view of what is going on in the system. He shares that they’ve caught a lot of corrective actions using STACS-CW that otherwise might not have been caught. He sees better quality, less risk, and more procedures and processes being followed accurately.

With the previous system, it was difficult, if not impossible, to know what cases were affected by a corrective action. Now all corrective actions are documented and the cases are identified. With STACS-CW, staff knows exactly which cases are affected. It limits the effect of a mistake.

### **STACS-CW is integral to MSHP’s DNA labs**

With two years of experience with STACS-CW, the DNA labs at MSHP have experienced improved documentation, increased productivity, a better working environment, elimination of paper, easier audits and increased risk mitigation.

According to the Lab Manager, STACS-CW is operating flawlessly, and his group is very happy with it.

*STACS DNA delivers the only sample management software designed specifically for DNA labs. Since 2000, we’ve helped DNA database and casework labs accelerate throughput, prevent errors, cut costs, improve data quality and meet accreditation standards. The FBI, RCMP, U.S. Army and DNA labs of all sizes rely on STACS DNA.*

*Why are we called STACS DNA? “Sample Tracking and Control Systems” for DNA—What we do is in our name!*

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