



# The Complete Forensic DNA Database Solution

## Creating a Productive, Efficient, and Quality Databasing Program

Identifying the best workflow for forensic DNA sample databasing is complex. Laboratories are tasked with selecting collection methods that are simple, while also being sustainable. They must also create a processing workflow that reduces error potential and generates high quality profiles. Can a collection method be both convenient and effective? Is there a system for tracking samples from the collection site to the laboratory and through the processing workflow? Can quality control checks be performed to minimize errors? Can samples be successfully processed years after collection? Is there a single solution that combines collection, storage, and tracking abilities while helping to meet various standards and accreditation requirements?

The answer to all the above questions is YES! GE Healthcare's FTA™ sample collection and collection devices provide easy to use collection, transport, and storage of biological samples for DNA analysis. The STACS DNA™ databanking application, STACS-DB™, delivers automatic audit trails, DNA-specific workflows, instrument and CODIS integration, and quality assurance related to reagents and instrument maintenance schedules.

Current STACS DNA clients have reported:

- 30% increase in sample throughput
- 57% faster peer technical review
- 90% faster case documentation
- 83% faster sample turnaround
- 40% lower sample processing cost
- 20% reduction in duplicate sample processing

The use of bar-coded FTA cards in conjunction with STACS-DB provides laboratories with a complete forensic DNA database solution.

### Quality samples lead to quality results

Whatman™ FTA cards and the EasiCollect™ System provide a convenient and high-quality sample collection option for reference samples. The cards use Whatman sample collection technology to lyse cells, denature proteins, and protect nucleic acids from nucleases, oxidative, and UV damage. DNA remains bound to the matrix of the FTA cards and can be used directly for downstream applications, including direct PCR amplification. FTA cards can be bar-coded for easy tracking through STACS-DB, connecting the offender with their DNA profile.



**Fig 1.** EasiCollect + Buccal Sample Collection Device from GE Healthcare enables simple, reliable buccal sample collection and buccal DNA protection when used with FTA collection cards. © 2016 General Electric Company. Used with permission.

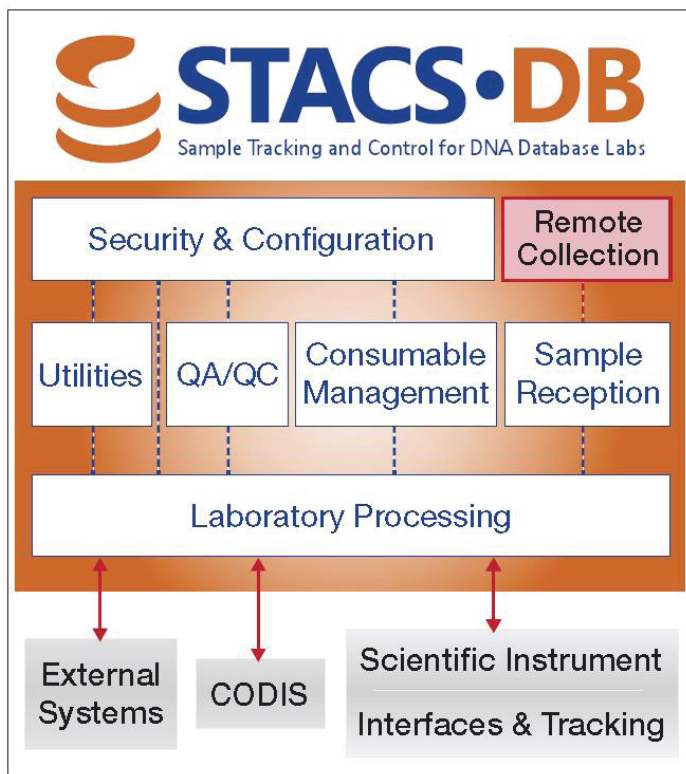


Fig 2. STACS-DB workflow

When samples are collected at prisons, jails, detention centers and parole/probation sites, offender data is usually hand written. When samples are received at the lab, staff may find information is missing or illegible. Samples cannot be processed until they track down the necessary information. To eliminate this problem, staff collecting the sample enter information into the STACS-DB Remote Collection Portal. The submission can be entered from any workstation with internet access, making it accessible across the jurisdiction. The use of secure usernames, passwords and encryption protects confidential information. There is no limit to the number of authorized users who can access the Portal, making this well suited for small and large organizations alike. Submissions are qualified to ensure a sample meets collection requirements, and are checked against the database for duplication at the time of collection. This process limits the number of duplicate, unrequired, and incorrectly collected submissions. Upon successful submission, the laboratory receives notification of the incoming sample through STACS-DB and can plan accordingly.

## Sample submission can be fraught with error

The rules governing offender sample collection vary and can be multifaceted. The correct offender documentation and sample collection is critical to future use of the DNA results. Many labs verify this information manually. STACS-DB, automatically reviews the submitted information for qualification and duplicate checks, decreasing the likelihood of processing incorrect submissions. Submissions with incorrect data are marked for further attention. Possible issues include:

Many labs verify this information manually, which is error-prone and time-consuming. Possible issues include:

- Incorrect demographic information
- Unusable fingerprints
- Missing or incomplete information
- Duplicate submissions
- Unqualified submissions

STACS-DB automatically reviews the submitted information for qualification and duplicate checks, decreasing the likelihood of processing incorrect submissions. Submissions with incorrect data are marked for further attention. This allows lab staff to focus on sample processing rather than administrative work. Eliminating unintentional processing of duplicate or unqualified submissions can reduce work by up to 20%, saving the lab significant time, effort and money.

Letters requesting recollection or additional information are issued directly from STACS-DB and the requests tracked. External documentation can be scanned and linked within the application for easy access to all submission materials. Using the software, laboratories are able to maintain detailed submission collection records with minimal effort.

## Efficiency beyond what is possible with manual data entry

Manual data entry from handwritten worksheets is a common method of tracking sample progress through the laboratory. STACS-DB eliminates the need for handwritten worksheets and manual data entry by managing the core of day-to-day laboratory work with automated tracking and recording of all sample-related information. This saves lab staff considerable time and effort so they can focus on benchwork rather than documentation. Integration with commercially available instrumentation allows the system to generate the necessary import files and receive instrument output files. STACS-DB offers the laboratory full control over processing methods by providing user configurable workflows, kits, plate layouts, and scenarios.

To augment technical review of the data by staff scientists, STACS-DB performs control verifications and will indicate any unexpected results that can be difficult to identify during human review. Once samples have been approved, STACS-DB generates files for easy upload to your database. Furthermore, STACS-DB imports database match detail reports, tracks database hits and hit confirmation runs, and can generate database hit notification letters upon completion of the confirmation requirements. STACS-DB can provide direct integration with the database, allowing a smooth transfer of data. In this way, STACS-DB enables laboratories to manage and generate reports regarding hits.

## Retain samples for decades

Forensic DNA technology changes continually. These changes paired with the need to perform new testing with cold cases makes, long-term reference sample storage essential for future testing. Blood and buccal samples stored at room temperature on Whatman FTA cards have been shown to be stable for 22 and 12 years respectively. The small card footprint and room temperature conditions limit the investment necessary for storage. STACS-DB contains detailed storage information, which reduces the time spent locating, retrieving and transferring submissions when additional testing is required.



**Fig 3.** STACS-DB contains detailed storage information of FTA sample cards, enabling rapid sample location and retrieval. Photo courtesy of the Michigan State Police Biometrics and Identification Division. ©2016 Used with permission.

## Quality processes boost productivity

Maximizing productivity in the DNA lab involves much more than tracking samples through laboratory processes. Quality Assurance and Quality Control (QA/QC) requirements often lead to bottlenecks or audit issues. STACS-DB contains numerous quality assurance measures that reduce errors involving standard operating procedures (SOPs), consumables, and instrument maintenance. Adherence to SOPs is reinforced by linking and displaying the laboratory SOP being used at any time. Consumables are automatically prohibited from use if they have expired, are pending QA/QC, or should not be used for processing.. STACS-DB is able to flag and prohibit the use of instruments and storage locations that require maintenance until the maintenance has been performed. Audit preparation is efficient and thorough, with tracking of proficiency tests, quality control runs, consumables, instruments, and storage locations, ensuring conformity with accreditation standards.

## End-to-end forensic database improves productivity, efficiency, and quality

The right technology can multiply productivity, increase efficiency, and improve data quality. Whatman FTA™ cards from GE Healthcare provide a simplified method of collecting, transporting, and storing reference samples for DNA analysis. STACS DNA's software solutions provide on-site collection abilities, automatic audit trails, DNA-specific workflows, instrument and database integration, and numerous other quality assurance functions. The combination of FTA cards and STACS-DB is a complete solution for quality forensic DNA databasing.

## Author biographies

Malena Jimenez is a Field Application Specialist with STACS DNA. As a Criminalist with the Missouri State Highway Patrol's multi-site DNA casework lab, Ms. Jimenez held positions as a LIMS Administrator, Safety Officer, DNA Auditor and Casework and CODIS Criminalist, where she played an active role optimizing the lab's automation. Ms. Jimenez is an ABC-certified Analyst with extensive courtroom experience and technical training, and holds a Bachelor of Science with dual majors in Cellular/Molecular Biology and Chemistry from Utah State University.

Dr. Hays Young is a Field Application Specialist with STACS DNA. At the Arkansas State Crime Laboratory, Dr. Young trained and qualified as a casework and CODIS DNA Analyst and DNA Technical Leader. For almost 10 years, he performed all the validations for the DNA and CODIS sections. In addition to working in human forensic DNA analysis, he has performed extensive research in lung disease and immunology. His knowledge covers over 17 years working in lung disease, PCR, qPCR, protein assays, gel electrophoresis, gene analysis, gene manipulation, cell culture, capillary electrophoresis, forensic sample chain of custody, forensic validation studies, and forensic DNA analysis. Dr. Young is a biochemistry graduate of Florida State University and a biochemistry/immunology doctoral graduate of the University of Texas—Health Science Center.

Melissa Schwandt is Product Manager and Global Applications Leader for GE Healthcare supporting product development and providing technical expertise in support of human identity products. Her extensive background in Forensic DNA testing includes working as a forensic DNA Analyst at both the Wisconsin State Crime laboratory and the NYC Office of Chief Medical Examiner with additional experience providing technical support and training for users of Promega's forensic DNA testing kits. Melissa earned a BS degree in Biology from the University of WI—Stevens Point and a Ph.D. in Experimental Pathology from the University of Utah.

## Company descriptions

STACS DNA delivers sample and kit tracking software specifically designed for forensic DNA casework and database labs. Since 2000, STACS DNA's solutions have addressed the shortcomings of many current LIMS by providing an automatic audit trail, DNA-specific workflows, CODIS and instrumentation integration, automatic grant tracking, sexual assault kit tracking and unmatched professional services. Most of the major forensic DNA labs in the United States are our customers, along with the U.S. Army and the RCMP. STACS DNA is based in Ottawa, ON and Fairfax, VA.

GE Healthcare's Life Sciences business addresses the need for efficient forensic sample collection with its Whatman™ FTA™ technology and capability to manufacture high-quality sample collection cards and kits. GE offers a wide range of off-the-shelf and custom FTA products for the collection of human blood and buccal (cheek) cells. Whatman FTA technology simplifies the collection and storage of biological samples and the purification of nucleic acids at room temperature. The resultant purified nucleic acids (DNA) are suitable for a range of downstream processing techniques.

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